ELECTRICAL REVIEW

[ILLUSTRATED.]

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NATIONAL ELECTRIC LIGHT ASSOCIATION.

A Notable Gathering of Representative Electric Light Men.

ANIMATED DEBATE OVER THE QUESTION OF MEMBERSHIP — DISCUSSION OF SEVERAL PAPERS AND OTHER MATTERS OF VALUE TO THE ELECTRIC LIGHTING INTERESTS.

The National Electric Light Association convened in the large parlor of the Hotel Dam, this city, at three o'clock, Tuesday afternoon of this week, President J. F. Morrison, of the Brush Company, Baltimore, presiding. There was a large attendance of earnest electric light men, and representative dealers in electric light apparatus power and supplies. In calling the meeting to order, the President spoke as follows:

"*Gentlemen of the Electric Light Association*—It is now six months since our last meeting. During that time I have no doubt you have all given some consideration to the subjects partially discussed at that meeting, and have come here prepared to discuss them in even a more intelligent manner than they were discussed then. I will take up only so much of your time as may be necessary to name the different subjects which will be presented before you for your consideration, and to present to the association for its action some matters of change in the constitution which have been made necessary by the action of the secretary and treasurer in resigning. Among the subjects for discussion will be that of the proper insulation of lines, the feasibility and cost of underground wires for electric purposes, the comparative desirability of the tower system of lighting with that of lighting by poles, the comparative cost of producing electric lights by steam and water-power, electric motors and their relation to electric lighting in the production of power, the best form of dynamo and the advantages of electricity over other illuminants for street lighting. Major Heap, of the United States Lighthouse Board, will address you on the subject of electricity for lighthouse purposes. I presume that, during the session, various matters will crop up which will attract the attention of the members of this association, and will be favorably discussed. There is one thing which, perhaps, it is better to warn you of ahead, if that term is admissible. An effort will be made during this convention to establish business relations between the different working companies; that is to say, to have such relations established as will lead to the establishment of a uniform price for electric lighting in the different parts of the country, and that without regard to the system by which the electric lights may have been produced. At the same time, and in that connection, an effort will be made by the consumers. (We propose to call the companies here consumers, as distinguished from the producer or manufacturer of lighting apparatus and supplies.) We propose to make an effort to bring about an equalization of the prices between the different manufacturers, so that, instead of destroying each other, this association may be the means of building up friendly relations between the different electric light companies of this country, and perhaps compel fairer play than you can coax out of what is known as the parent companies. That applies all the way down from the manufacturers of machinery to the manufacturers of carbon. I declare the convention now open for the transaction of business, and the first business in order is the report of the Executive Committee."

Mr. G. S. Bowen—"The Executive Committee had in hand the examination of the accounts of the secretary and treasurer, and report as follows: 'That the amount already received for membership is $626, sixty-two names having been registered and the dues having been paid. There have been also added since this report was made the names of three other gentlemen. There has been expended $415.67, vouchers for which I hold in my hand, and which the Executive Committee have approved.' And now I move you, Mr. Chairman, that the report of the Executive Committee, so far as the finances are concerned, be approved." The motion was carried.

Mr. Bowen—"It has been found very desirable to amend our constitution in one or two particulars, and I have, as a part of my report, a resolution offering to change Article III., so that it shall read, after the words 'electric lighting,' etc., as persons eligible to membership, companies, individuals or firms, engaged in the manufacture of machinery or apparatus connected with electric lighting—'electricians, electrical engineers, or business collaterally connected therewith.' The object of making this change is that all persons interested in electrical lighting, the manufacturer of electric apparatus, or anything pertaining to electric lighting or electricity, in any way, may become members of this association; and I move you, Mr. Chairman, that this amendment may be made as proposed."

The President—"Gentlemen, the amendment is presented as the result of the action of the Executive Committee, and is now before you for your action. The effect of this amendment will be to make eligible electrical engineers, and all those who are engaged in business collateral with electric lighting business."

A Member—"I move you, sir, that the recommendation of the Executive Committee be adopted, and that the Constitution be so changed in accordance with the recommendation." Adopted.

Mr. Bowen—"It was discovered that article 4 provided that the secretary and treasurer should be one and the same person. It has been decided by the Executive Committee to recommend a change in the constitution so that it will read that the officers of the association shall be a president, three vice-presidents, a secretary and a treasurer, who may be one and the same person. It does not provide that they may be one. We therefore offer this resolution:

Resolved, "That Article III., line 5, be amended so as to read 'may be' instead of 'shall be' one and the same person." Adopted.

Mr. Bowen—"The secretary has handed me the following, which I will incorporate in my report. It is the resignation of Mr. Baldwin as treasurer. 'I hereby tender my resignation as treasurer of the National Electric Light Association. Very respectfully, Summerfield Baldwin.' I move you that the thanks of the association be tendered Mr. Baldwin for his services up to the present moment, and that his resignation be accepted." The motion was carried.

Mr. Bowen—'The Executive Committee have very hurriedly put these little items in form as well as they could. Before another session we will have formulated a more correct report. I beg you will pardon this informality, and I will merely say that I am delighted, as the chairman of the Executive Committee, to see so many gentlemen here, and I trust that the proceedings of this meeting will be full of interest and profit to all who have been kind enough to favor us with their presence."

A Member—"I presume it would be preferable for the president that he and the secretary should both be located in the same place, as there are a number of matters of business pertaining to the association that require the joint action of both those officers. Now I would suggest that if the president of the association know of some person in Baltimore who would be a fit person to fill that office, that he suggest the name."

Mr. E. R. Weeks—"Action has been taken according to the gentleman's suggestion. If any nominations are in order, I would nominate for treasurer, Mr. H. M. Linnell, and for secretary, Mr. A. G. Rheinhard, a fellow-citizen of our president."

Mr. Elder—"I put in nomination for the secretaryship of the association, Mr. Martin. My idea in doing this is that I believe that the secretaryship of the association should be held by a person who is not pledged to this system or that system."

Mr. Wadsworth—"I would like to put in nomination, Mr. Chas. W. Price, of the Electrical Review. I fully concur in what Mr. Elder has said in regard to the office of secretary."

Mr. Price—"I would like to say for Mr. Price, that he respectfully declines the honor; that he thinks that if the recommendation of the Executive Committee is carried out it will be the most satisfactory."

The President—"Mr. Price declines. A. G. Rheinhard of Baltimore, and Mr. Martin of New York, are nominated for secretary. Mr. Martin is not a member of the association. Mr. Rheinhard is."

After some discussion on the question of who had the right to vote, the roll was called on the vote for secretary, and resulted in favor of Mr. Rheinhard by a vote of 22 to 8.

Mr. Linnell of Hartford, and Mr. Cooper of Brooklyn, were placed in nomination for treasurer.

After some discussion as to the right of Mr. Porter, of the Pittsburgh Carbon Co., to vote, the chair ruled that he had not, and the first vote resulted in a tie. On second ballot Mr. Cooper was elected.

Mr. Bowen—"I move that Mr. A. J. Dam serve at this convention as sergeant-at-arms." The motion prevailed.

Mr. Garrett of Baltimore and Mr. Stanley of Bridgeport, were elected assistant-secretaries of the convention.

Mr. Bowen—"With your permission I would like to read this dispatch:

"Boston, Mass., Aug. 18.

"J. F. Morrison, Pres't.

"Extremely sorry not to have been with you to day. My business called me here.

(*Continued on page* 4.)

Electric Street Railway in Philadelphia.

President Edwards and the directors of the Ridge Avenue Passenger Railway Company, Philadelphia, have given permission to the American Electric Railway Company to lay a conduit and experimental line on Ridge avenue, from the depot at Dauphin street to Laurel Hill Cemetery. The work of laying the conduits and conductors for the electricity will begin in about a month. The American

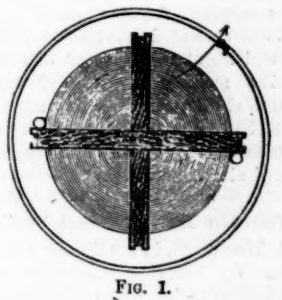


Fig. 1.

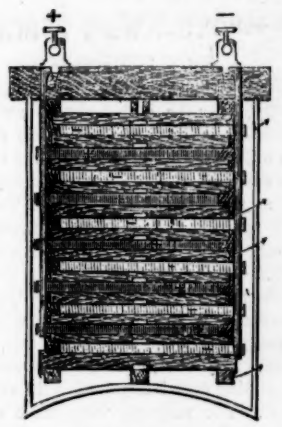


Fig. 2.

Glaesener Secondary Battery.

Company was formerly known as the Bidwell Company, and during the Franklin Institute Electrical Exposition last fall operated an experimental car and track, over which thousands of passengers took a short ride under the shed of the Pennsylvania Railroad Station on the east side of Thirty-second street. The reorganized company at first intended to lay its experimental tracks in order to demonstrate the applicability of the electric motive power in Fairmount Park, and obtained authority to this effect from the Commissioners, but subsequently the decision was made to lay down a conduit and establish a plant in connection with an existing street railway as a better means of demonstration to the public and those interested in electric railways.

The work will be under the supervision of W. M. Schlesinger, an English electrical engineer, who has studied the science in England, France and Germany. He states that Ridge avenue was chosen because of the peculiar grades, and in order to show the superiority of the new motor over horse-power in surmounting them in all weather.

The Electric Company will next week start work on its shop and engine-house. One car, provided with a motor, will be run at first, and this will not interfere with the trips

of the regular horse-cars. The car will be one of the ordinary cars altered for the purpose, and will carry as many passengers as usual, the idea being to give the two motive powers a fair test, the claim being that the electrical is greatly the cheaper. The conduit will be laid so as to avoid interference with the travel of the horses, and the tracks will not be disturbed.

In shape the conduits will somewhat resemble those laid by the Traction Company, but will be of heavy timber, instead of iron, below ground. It will be braced inside with iron knees and provided with drainage facilities. Running along beneath the top will be the compound conductor of copper and iron, half circular in shape, well insulated and protected from damage from outside influences On the top of the conduit forming each side of the slot, which will have a half inch opening, will be iron plates about five inches in diameter altogether. This slot opening will not be directly in the center of the track, but to one side of the meridian line.

The current will be transmitted by an ingenious contrivance from the conductor underground to the motor in the car, and will be under instant control of the driver or engineer. At intervals of eighteen feet plates will be arranged over the conduit, which may be readily removed for repairs and other work, and without removing the body of the conductor. The bottom of the conduit will be cemented previous to filling in the ground about it. A speed of seven to ten miles an hour is claimed for the experimental Ridge avenue line, and a saving of $2.50 to $3 per car over horse-power. The engineers are sanguine of the success of the electrical street railway.

A Primitive Electro-Magnet Engine.

F. G. Woodward, in the *American Machinist*, gives the following description of an electro-magnet engine, constructed years ago, and which we illustrate on this page:

"I recently discovered, among some old drawings, a sketch of a magnet engine which I saw in operation in Boston a little more than forty years ago, which, at this day of electricity, may be of interest to some of your readers. The lively, energetic action of this little machine so interested me that I at once made a sketch of it, and subsequently (while at the Rensselaer School of Troy in 1839) I made a more complete drawing of the machine, the present illustration being a reduced copy of the same. It was a small affair, the rotating wheel, *a*, being only about five inches in diameter, the whole thing being composed of six electro magnets, viz.: three stationary ones, *c*, and three rotating, *d*, the rotating ones being fixed to the vertical shaft, *B*. The magnets were made of ½" soft round iron with a sort of triangular head, as shown, and wound with a few turns of insulated copper wire near their heads as indicated by dotted lines.

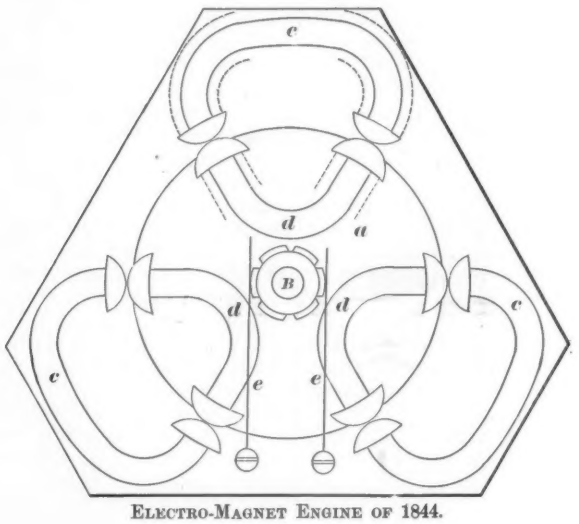
"The six magnets were all charged by a single battery about the capacity of a quart mug; the battery consisting of a copper cup containing several concentric circles or cylinders of zinc and copper alternately, requiring about a pint of dilute acid for a charge.

"The alternate attraction and repulsion which caused the wheel to rotate, was brought about by six copper segments seen around the shaft, *B*, the segments having no metallic connection with the shaft. The ends of the wire covering the rotating magnets were soldered to the segments in such a way as to cause the continuous changing of their polarity six times in each revolution. Two copper springs, *e*, resting slightly in contact with the segments, served as conductors from battery to magnets, *d*, through the medium of the segments. The shaft, *B*, carried a small bevel gear which worked a larger gear, not shown, the proportion being about 1 to 12. The horizontal shaft which carried the large gear being smoothly finished and about ⅜" in diameter, offered a good chance to test the power of this little machine. I saw no one capable of stopping it by grasping this shaft with a single hand."

The Brooklyn Committee.

Professor George W. Plympton, President of the Underground Wire Commission, of Brooklyn, said to a reporter that the telegraph and other companies doing business in that city show a disposition to meet the Commission half way, and in reply to various questions gave the following summary of the situation:

"We were directed by the law to invite telegraph and telephone companies to submit plans for putting their wires under ground. The limited time afforded expired last week and it becomes the duty of the Commissioners to study those plans carefully with reference to the adoption of one or more of them. Plans have been coming in since the Commission was first organized, mostly, however, from inventors who do not represent corporations, so that we have a large number before us. We exchanged them about among members of the Commission and examined them separately, but have held daily consultations over them since August 3. Not having closely examined the plans submitted yesterday, I can't give you any specific description of a proposed plan of any one company. It is proper to say that each company will strive to vary its plan according to locality, and we shall doubtless have to accept such a general proposition. These plans, so far as we know them, differ very much in their cost. To adopt an expensive plan in a place where there are but few wires might force a company to abandon that part of its route. I want to say, also, that the chief difficulty will lie in finding a plan which will bury the lines of different companies; which means, of course, different kinds of wire—telephone, telegraph, electric lighting—with the least digging up of the streets. If the companies urge different plans, then we must labor to bring about a compromise plan for those streets occupied in common. For this purpose, after we have studied such plans, we shall invite those gentlemen to meet us to discuss them."



ELECTRO-MAGNET ENGINE OF 1844.

—— The City Council of New Orleans has voted to accept the bid of the Lousiana Electric Light and Power Company for 528 pole lights at $115 per pole per annum, for lighting the suburban districts of the city, and the Mayor was authorized to make a contract for two years. This is recorded as the cheapest bid proposed. New Orleans is one of the first cities of its size on the continent to adopt electric lighting for all purposes.

—— At the Milwaukee Exposition, next month, the arrangement for lighting the building is the best ever attempted. In addition to the customary number of gas jets, an electric light system of 110 arc lights and 350 incandescent lights has been prepared. A large number of colored lights are also being arranged. The panorama, Battle of Lookout Mountain, which was so prominent a feature last fall, will again be on exhibition this year. The painting has been retouched, natural pieces added, and the work greatly improved in various ways.

It Applies to Business Generally.

My son, there is nothing on earth so mysteriously funny as a newspaper advertisement. The prime—first, last and all the time—object of an advertisement is to draw custom. It is not, was not and never will be designed for any other human purpose. So the merchant waits until the busy season comes and his store is so full of custom that he can't get his hat off, and then he rushes to the newspapers and puts in his advertisement. When the dull season gets along and there is no trade, and he wants to sell goods so bad he can't pay his rent, he takes out his advertisement; that is, some of them do; but occasionally a level-headed merchant puts in a bigger one and scoops all the business, while his neighbors are making mortgages to pay the gas bill. There are times when you couldn't stop people from buying everything in the store if you planted a cannon behind the door, and that is the time the advertisement is sent out on its holy mission. It makes light work for the advertisement, for a chalk sign on the sidewalk could do all that was needed and have a half holiday six days in the week; but who wants to favor an advertisement? They are built to do hard work, and should be sent out in dull days when a customer wants to be knocked down with hard facts and kicked insensible with bankrupt reductions, and dragged in with irresistible slaughter before he will spent a cent.

That's the aim and end of an advertisement, my son; and if you ever open a store don't try to get them to come when they are already sticking out of the windows, but give them your advertisement right between the eyes in the dull season, and you will wax rich and own a fast horse, and perhaps be able to smoke a good cigar once or twice a year. Write this down where you will fall over it every day. The time to draw business is when you want business, and not when you have more business than you can attend to already.—*Bridgeport Post.*

—— The Philadelphia Park Commissioners are asked for $5,000 for lighting the Park between Girard avenue bridge and Fairmount with electric light and the purchase of the necessary plant.

—— Electricity has been brought to the aid of the sportsman by the use of a small lamp for the front sight of a rifle, to render it visible in the dusk, or when from any cause whatever there is insufficient light. The minute electric lamp is fixed near the muzzle of the gun and shielded by a metallic screen. The current is supplied by a small battery in the stock.

—— The consolidated electric lighting interests of Boston is managed by the following board of directors, which is composed of three from each company: Brush—Isaac Fenno, Joseph Sawyer and Frederick Mason; Weston—Thomas L. Livermore, F. L. Higginson and Andrew Robeson; Merchants'—E. H. Goff, Silas Gurney and E. S. Sears. Colonel Thomas L. Livemore was elected president, Hon. Hugh O'Brien, treasurer, and S. S. Sias, clerk.

Revival of an Old Telegraph Suit.

The suit of the late F. O. J. Smith, of Portland, Me, against the Western Union Telegraph Company, promises to be a protracted legal contest, in case the bill of revivor that is asked for by the executors of Smith's estate is granted. Judges Goddard and Waterman, who are two of the executors, appear for the plaintiff, and Bion Bradbury, assisted by Atty.-Gen. Baker, are counsel for the respondent. Important interests are involved in the suit, and there is every probability that it will bristle with sensational points. The suit was commenced in the United States Circuit Court in 1875, by Mr. Smith, in which it is claimed that a large sum of money is due him from the company.

Smith died in 1876, leaving an insolvent estate. His executors endeavored to effect a settlement with the company, but failed. Proceedings in court were suspended until last April, when the executors filed a formal action for a bill of revivor, and the struggle now is whether it shall be granted. The respondents plead that the executors have been guilty of laches in not sooner filing their bill of revivor, and that six years having elapsed they are barred by the statute of limitation. The complainants retaliate with a similar charge. They state that Mr. Smith held a peculiar relation to the Western Union Telegraph Company in the early days of its existence, and to the telegraph itself. He was in Europe when Prof. Morse was making his last visit there prior to the introduction of his system. Mr. Smith returned in the same vessel with Prof. Morse, and made his acquaintance. Mr. Smith was not idle that trip, for, in addition to writing a book, he also succeeded in making Prof. Morse see that he could be very useful in bringing the great invention before the public. At that time Mr. Smith was a distinguished lawyer, with a growing reputation as a statesman. Before the vessel reached New York, Mr. Smith was not only in the secret, but had obtained from Prof. Morse an assignment of a considerable share of the great invention. Mr. Smith labored for a time with great zeal to forward the interests of the company that was formed, but later proved rather hard to manage, and his interest in the invention was purchased by other parties, Mr. Smith receiving a sum large enough to be in those days regarded as a fortune. Later in his life, Mr. Smith had rather peculiar relations with the Western Union Telegraph Company, acting, as it is said, at times as an attorney, and again as a lobbyist. He claimed very large sums to be due him from the company, and, when he commenced suit, it is said he claimed to be in a position to make some very damaging disclosures.

.... Our Salt Lake City correspondent writes that telephone and electric light business is running along quietly in Utah. Col. Sherwin, auditor of the American Bell Company, spent several days there last month, and Col. R. C. Clowry, M. C. Bristol, C. H. Summers, of Chicago, J. J. Dickey, of Omaha, Frank Jaynes, of San Francisco, all of the Western Union Telegraph Company, were there from the 14th to the 19th of July. Mrs. Clowry and Miss Esterbrook (Mrs. Clowry's cousin) were there on the 18th and 19th, and accompanied the party to California, where they all were at last accounts.

.... Differences regarding the telegraph poles which the Syracuse (N. Y.) city authorities want removed, and the telegraph companies are equally desirous of keeping in position, are quelled for a time at least. Parties on both sides of the question have agreed to suspend hostilities until the argument of the injunctions before Judge Kennedy. Recently, the justice, at the request of City Attorney Jenney, made an order so altering his injunction as to give the city officers right to interfere with the raising of any additional poles or wires. Five linemen, named P. Gleason, Jay McGinty, Frank Brocten, Samuel Mason and William Mack, who were engaged in stringing wires for the Baltimore and Ohio Company, were arrested. They were arraigned and released on bail until the 13th instant.

The Electric Light and Microscopy.

At the recent meeting of the San Francisco Microscopical Society, Mr. Banks gave an interesting demonstration of the electric light in its relation to microscopy. He first showed a miniature incandescent loop lamp actuated by a sulphuric acid and sulphate of mercury battery. For purposes of microscopical illumination, the incandescent electric light possesses the great advantages of extreme whiteness and intensity. With regard to the batteries actuating these lamps, there are still some difficulties to be overcome, but there can be scarcely a doubt that it is a question of only a short time when, with increased steadiness, duration of action and cheapness of battery power, the electric light will be superior to all other methods of artificial illumination for microscopical and microphotographic purposes. Mr. Banks also showed under the society's largest microscope the electric spark in its passage between the terminals of a ¼in. spark induction coil attached to a Grenet bichromate solution battery. Two vulcanite slides had been prepared, on which were fastened adjustable platinum strips connected with the battery wires, and terminating in brushes of platinum wire of extreme tenuity. The electric fluid in its passage from one terminal to the other, formed a very attractive object under the microscope. One of the slides was used to show the effect on the electric spark of interposing films of soot of different thickness. In its passage through these the current was deflected into meandering lines, around which scintillated showers of sparks. The particles of soot could be seen arranging themselves in symmetrical groupings around the terminals. In conclusion, Mr. Banks announced that he had sent for, and would soon be able to exhibit the Stokes-Watson apparatus for showing under the microscope the combustion of various metals in the electric arc. Their characteristic spectra can also thus be shown by the micro-spectroscope.

Meeting of the Underground Wire Commission of New York.

The Electrical Commission, composed of Messrs. Leow (chairman), Hess and Moss, met in a parlor at the Metropolitan Hotel last Friday afternoon. On motion of Commissioner Moss a resolution was adopted to advertise in the newspapers for electricians to submit plans for the construction of electrical highways.

Chairman Leow quoted the law by which the committee is authorized to deviate from the underground system, and cited the following exception: "Whenever in the suburbs or along the streets, avenues or other highways in sparsely inhabited or unoccupied portions of this city the public interests do not require the electrical conductors to be placed underground."

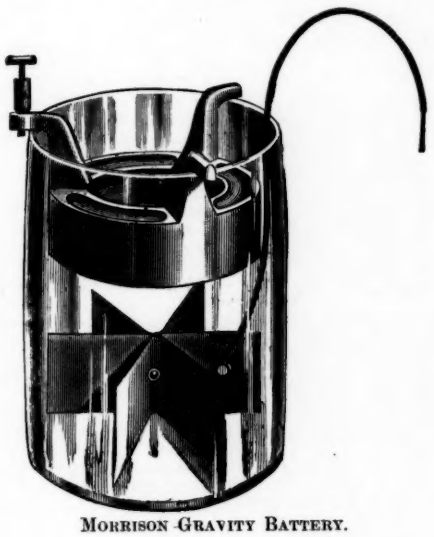
In connection with this the following resolution was adopted: "That this Board will not entertain any applications for permits to deviate from an underground system that are not based upon one at least of the grounds of exemption aforesaid."

Chairman Leow also introduced the following resolution, which was adopted: "That the Secretary procure from the Department of Public Works of the City of New York, and keep on the files of this Board an accurate list of all corporations, associations, companies, and persons using or maintaining electrical wires or other such conductors above or under ground in said city, authorized by the Aldermen or not, and that the list and other information so procured from said clerk be kept on the files of this Board."

A communication was received from Edward S. Stokes, as representative of the Bankers and Merchants' Telegraph Company, saying that the company was willing to put its wires under ground, and would submit plans next week. Plans for subways were read that came from several telegraph and cable companies, and from one electrician, who said all the wires in this city could be put under ground for one and a half million dollars.

The Morrison Gravity Battery.

This battery was devised by J. F. Morrison, of Baltimore, Md., at the time superintendent of the Municipal Telegraph of that city, for the service of the fire-alarm telegraph then just completed by the Gamewell Fire Alarm Telegraph Company, of New York. It proved to be such an excellent battery in every respect for fire-alarm purposes that the Gamewell Co., after two years' test, adopted it as the standard fire-alarm telegraph battery, and it is now in use in over 300 towns and cities. The peculiar form of the zinc element—a beveled ring supported by three arms—presents a greater surface with less weight of metal than any other. The binding, or connecting post, is a feature. It is interchangeable, and keeps the contact points where the elements are connected, high and dry above the evaporation from the liquids. The copper elements are broad and thin, made in such form as to present the greatest surface to the action of the battery. The connecting wires are riveted to the copper and carefully insulated with gutta-percha through their entire length. The sulphate of copper can be fed to the battery at any time without disturbing the equipoise of the fluid. It is easy to clean and can be used up to the last ounce of metal below the arms. Its use has until lately been confined to fire alarm purposes, but now it is being used by the B. & O. Telegraph Company in their district service with marked success. The Southern Electric Company, of Baltimore, Md., of which Mr. Morrison, the inventor of the battery, is president, are the sole manufacturers of this battery. The zinc elements are made from the highest grades of spelter, such as "Star Lehigh," "Bertha," etc. The battery is one that will continue to grow in favor as its many desirable qualities become better known.



MORRISON GRAVITY BATTERY.

* * Lightning is reflected for one hundred and fifty to two hundred miles, and thunder may be heard for twenty or twenty-five miles.

* * The Denver *Republican* says: "Breckenridge is enjoying its first real season of substantial prosperity. Numerous stamp mills are pounding away on pay quartz, and the golden product is more eloquent than written words. A gentleman just returned from Breckenridge is quite enthusiastic over the performance of the Wiswell ore pulverizer and electric amalgamator. It is quite a simple contrivance, consisting of four heavy chasing rollers running in a pan which reduces the ore to any required fineness. It has a capacity of fifteen tons per day, and does the work at much less cost than stamps of like daily capacity. A current of electricity generated by simple mechanism over and attached to the main shaft, is passed through the machine while in operation, which keeps the mercury clean and intensifies its action, so that rusty gold is caught by it as readily as though bright. Electricity is such a powerful agent and adjunct to so many enterprises, that its introduction into the mining industry will be watched with great interest by all."

The Telephone and the Lightning.

When lightning strikes the telephone wires subscribers' bells ring. But nobody answers. In the central office all the shutters drop. But the operators don't answer. The lightning is carried off by a "lightning arrester." Sometimes sparks fly around the switchboard, but there seems to be no more danger there than anywhere else, unless it is an extremely heavy charge. To meet such an emergency, a machine has been invented by a Boston man which is thus described by a local paper:

"A very ingenious device for the protection of telephones from being burned out and otherwise injured by lightning and contact with electric lighting wires is on exhibition at 37 Pearl street. It consist of a small automatic machine, the principle being that the current passes through the coil. Its armature is not attracted when the ordinary telephone current is passing through, but when the current reaches a certain strength the magnet acts automatically to cut the telephone out and establish a path for the current to pass to the ground through the core of the magnet. Quite a number of gentlemen versed in electrical matters were present when the device was tested, and they one and all pronounced it to be of great value to the patrons of the telephone and a positive preventive from fire by electric current. Mr. David J. Cartwright, a graduate of the School of Technology, is the inventor."

* * During 1884 the average number of letters addressed to each person in the United Kingdom amounted to 38. The number of post-offices is 16,434, and the force operating the business equals 48,000 persons. The savings in the postal banks increased by £3,004,965, now amounting to £44,773,773. There has been but little increase in the telegraph business, although there has been a gain in expenditure, and last year the latter exceeded the revenue by about £36,000.

* * In a recent paper read before the Inventors' Institute, at London, it was stated that not least among the advantages of the electric tram-car system was the economy in the cost of running, which is estimated at 3½d., including a depreciation of 35 per cent. on the outlay. The estimate for the complete equipment of steam engines, dynamos, and needful apparatus for a charging station to supply a dozen electric cars, were placed at about $20,000, while the equipment of 12 two-horse cars was reckoned at $30,000.

* * The contract for putting in the large annunciator and room call at the West hotel, Minneapolis, has been let to the Municipal Electric Lighting and Construction Company. With the room call the clerk can instantly answer the call of an impatient guest; can call a guest at any hour, avoiding the necessity of sending a porter to awaken a sleeping guest by pounding on his door, thus avoiding annoyance to the guests in the adjoining room. He can also ascertain if a guest is in his room by simply pressing a button on the dial corresponding to the number of the room he desires to call. This system is very complete.

* * Not many people of those who have witnessed during pyrotechnic displays, the bursting of those wonderful bombs which sent out showers of gold and parti-colored stars, have any idea of how they are made and fired. The principle is the same as in the military shell, the casing being made of paper instead of heavy metal. Two hollow hemispheres are charged with innumerable conical-shaped stars made from compressed coloring matter, and when the halves are joined together and paper-sealed, they are thrown from a mortar. Unless the stars are carefully arranged, they are apt to detonate by the force of the powder exploded in the mortar. The distance to be traveled by a shell before the stars shall break is regulated with a fuse running four, five, ten, fifteen or twenty seconds. This fuse, which is a necessary adjunct to all fancy fireworks, is a simple contrivance. It is a compound of meal powder, gum arabic, alcohol and water, and is very combustible. At the moment the shell leaves the mortar the fuse ignites, and is gradually consumed until the flame reaches an interior cavity of the shell holding a charge of powder. Instant explosion ensues, the shell breaks with a loud report and sheds the burning stars in a perfect shower of beautiful colors.

* * The various trials of the Daft electric motor on the Union Line Track, Baltimore, have been so successful that cars are now to be run regularly. Fifteen miles an hour was the rate of speed at a recent test. Considerable trouble has been caused by the contact of animals and human beings with the middle rail, which is highly charged with electricity. On Monday, several Hampden boys experimented with the rail and were severely stunned. A horse belonging to N. A. Cornelius stepped on the rail at Mount Vernon switch and was so shocked and surprised that he kicked the harness and shaft all out of repair. Another horse attached to a cart loaded with stone was knocked down by contact with the rail and badly cut. A horse belonging to W. H. Orriloff, a butcher, suffered the same fate, and, in expressing his feelings, he wrecked the harness. A flock of geese perched upon the electrified rail at Hampden Hall; they were knocked in all directions; one was hurled five feet in the air. A dog who witnessed the unusual commotion among the feathered bipeds, went to investigate the matter. As soon as he touched the rail he turned a double somersault, and picking himself up, went off yelping. Notices have been posted along the track warning people to keep off the central rail.

* * The Zankerode Electric Railway was a good beginning in the application of electro-motors to the work of underground haulage. The success of this experiment has led to a further step being taken in the same direction, and we now have an excellent example of an important electrical mineral line. This line is now in operation at the Paulus-Hohenzollern Collieries in Upper Silesia. The line, which is 800 yards in length, has been constructed for a traffic of 500 tons of coal in ten hours. This result Messrs. Siemens and Halske have guaranteed. The electrical locomotive weighs two tons; it is controlled by a specially devised regulator, which is said to give great satisfaction to those in charge of the train, by its prompt and certain action. The insulated conductor consists of flat iron bars, galvanized at the ends and connected by means of fish plates. This conductor is suspended from the roof upon insulators. Brushes on the locomotives take the current from the conductor. The line is connected with the generator by cables about 250 yards long. The generator is driven by a belt from the flywheel of the engine. The trucks weigh 10 cwt. each, and have a capacity of 11 cwt. The train is composed of fifteen trucks, so that the useful load hauled is a little over eight tons, and the whole load nearly sixteen tons. With this load a speed of seven and a half feet per second is reached. With an empty train the speed is 12 feet a second. At present the output is not sufficient to require the maximum transport of five hundred tons a day.

Electrical Review.

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NEW YORK, AUGUST 22, 1885.

The general agents, some twelve in number, of the Edison Company, were in New York Monday and Tuesday of this week, conferring with the parent company and receiving and giving points on future business.

With the National Electric Light Association, the Old Timers and Military Telegraphers and the general agents of the Edison Company all in the city this week, New York was pretty well supplied with well-informed electrical gentlemen.

The Old Timers and Military Telegraph Corps held their reunions at the Murray Hill Hotel this week, many well-known veterans of the key being present. Action was taken to request Congress to recognize the military telegraphers as members of the regular army, to be entitled to all the privileges which they enjoy. Those present all seemed to enjoy the reunion, many visiting the sea-shore and other points of interest.

Messrs. Bowen, Weeks and Ridlon of the Executive Committee, and the editor of the REVIEW, visited the works of the Metalite Wood Company at the foot of 24th street, North River, after the adjournment on Thursday afternoon, and witnessed a most remarkable series of tests with building material fireproofed by this companies processes.

An ordinary yellow-pine floor was covered with shavings, sticks and wood a foot in depth, which were set on fire and consumed to ashes without injury to the floor. A pine box one foot square and three or four in depth was filled with live, hard coals, taken from a furnace under the steam boiler. The coals burned out to cinders, but did not set fire to or scarcely mark the box. A section of a shingle roof, some two feet square, was covered with shavings and wood, and set fire to without injury to the roof. When the same roof was saturated with coal oil, the oil running between and under the shingles, fire being set to the oil, it burned off without any apparent injury to the roof. The most extreme tests were made to ignite this material without success. The material is being tested in various ways as to its insulating and other qualities as applied to electric construction—its fireproof qualities are unquestioned. In our next issue we will give a description of the process, and the result of pending investigations.

THE "REVIEW'S" ENTERPRISE.

Elsewhere in this number of the REVIEW will be found a verbatim stenographic report of the proceedings of the National Electric Light Association, which met on Tuesday, the 18th inst., in the Union Square Hotel, New York City.

As is usual at such times, the REVIEW beats all its contemporaries in the completeness of its report and the careful and intelligent treatment of all the details. Three, and and at times four, members of the staff of the REVIEW were present at the convention, besides the stenographer employed by the REVIEW. No other journal save the REVIEW employed a stenographer for the occasion. The headquarters of the REVIEW during the days when the convention was sitting were established in two rooms at the head of the stairway, for the use of the editorial staff, and a suite of apartments in the Hotel Dam, (which is a part of the Union Square Hotel) was also taken by the REVIEW for the convenience and entertainment of the members of the convention.

THE CONVENTION.

The Union Square Hotel has long been known for the excellence of its *cuisine*, but not until a very recent period has it attracted attention as the home of Science. Hence, when its guests awoke last Tuesday morning, and sounds of learned strife fell upon their ears, they were naturally puzzled to know the cause thereof. The frequent recurrence of such terms as "dynamo," "synchronous," "aluminium," "micro-electro," "photometric tests," "farads," "ohms," "Bunsen coils," "Leclanche cells," "dynamic forces," "isothermic" and "isodynamic" lines, and the like, clogged their mental faculties for a time, and upon coming to again, they concluded that Mr. Dam was holding a convention of *chefs* and cooks, and that the extraordinary sounds they had heard were really the names of new and no doubt delectable dishes just become known to culinary science.

When the members of the convention discovered the effect their ponderous language was having on the guests of the house, they, with a precaution that did them credit, instantly elected Mr. Dam, Sergeant-at-Arms, not, as many outsiders supposed, to keep order within the convention, but, on the contrary, to keep order without, when the exasperated guests should learn that they were only harmless scientists who had filled the air with horrid sounds.

The long lines of seats in the private dining hall on the first floor of the Union Square Hotel were nearly all filled when President Morrison opened the convention in his usual vigorous and pointed style.

As is the case with all deliberate assemblies, a greater part of the first day was taken up with the details of organization. Intelligence and courtesy pervaded the convention; points of difference were taken up one by one and quietly settled, in a discussion where every one had a chance to be heard and a patient hearing. This spirit of fairness and reason prevailed from the moment of opening, and lasted until the final adjournment. And during all this time no angry voice nor heated discussion came to mar the proceedings. Few large assemblies like this pass off without internecine strife; but, from the very nature of their business, electrical people must be intelligent, reasonable and tolerant, and with such persons turmoil is particularly distasteful.

Even in the discussion which came up toward the close of the first day's proceedings, as to the qualifications for voting, there was nothing of acrimony, nothing of ill-nature or excitement.

The aims of the founders of the National Electric Light Association was to bring together all those engaged, as firms or individuals, in operating electric lighting plants or manufacturing electric lighting apparatus, for mutual protection and advantage, to establish a fellowship among those in the same business, and, if possible, to protect them from senseless and unreasonable competition and illegitimate business methods. The necessity for such an organization is not far to seek. The country is broad, the field yet unexplored for electric lighting vast, and the business of electric lighting scarcely more than in its infancy. Why, then, should rival companies enter into a crusade of ruinous competition in the same districts? As every business man knows, such a condition of things leads to demoralization, with the result that neither party makes a living profit, if, indeed, as has been the case in more than one instance, one or the other, or both, are driven from the field. Nor is the public in any way benefited by such a condition of affairs. No company selling light without a profit can give good service, and no consumer can expect it.

Another object sought to be accomplished by the National Electric Light Association is the chance which such an organization affords of comparing processes and experiences. The electric lighting apparatus of to-day is very probably as near like the electric lighting apparatus of the future as Dr. Watt's tea-kettle is like the present type of steam-engine in the locomotive. Improvements in plants, processes and business management are continually being made and a mutual interchange of ideas and experience must be of inestimable value to all engaged in the business and as much to one as to another. These, then, are the reasons which have impelled the electric-lighting fraternity to meet together and establish cordial relations.

In the afternoon of the first day of the sitting of the convention, the question of eligibility to vote came up and fortunately there was a striking illustration at hand to show a very serious defect in Article II. of the constitution, which inferentially gives the right to vote to anyone operating an electric-light plant. The right was claimed, and not without reason under the then existing law, by a gentleman who operated a *one*-light machine. Now, however, owing to the sound common sense and good judgment exhibited by the committee to consider the matter of who shall have the right to vote, companies and individuals must be engaged in the *business* of operating electric-light plants in order to qualify as voters. This ruling is positively necessary in order to insure that the objects for which the association was organized shall not be lost sight of. The man who sells carbons to him who employs electric lights in his factory or mill gets all he is entitled to, or all that he can reasonably expect, when he is given all the privileges of the association. He can be present at all meetings, can have the floor at proper times, enter into discussions which affect his business, and compare notes with those who use the material he manufac tures.

Some curious facts cropped out during the debates, among them that the entrance of an electric-lighting company into a district where gas is used invariably increases the business of the gas company instead of diminishing it as would naturally be expected. This is, of course, attributable to the fact that people using gas become accustomed to more light when electricity comes, because the intensity and effulgence of the one is sure to dim the other by comparison. The question of fuel and power was gone into very thoroughly by the convention, and very properly too, for both are of the greatest importance. A means was shown whereby large engines only used at night for generating light, could be advantageously employed in the day time as well, for furnishing power for mills situated on the premises. But, as a matter of fact, there is a far better and more certain means of utilizing the unemployed power of engines connected with an electric lighting plant and that is by the distribution of electric energy during the day hours by means of conductors. That is to say, we have already progressed that far in the transmission of power by wire as to make it economical to send small parcels such for instance as from five to ten horse-power to a short distance, say a mile and in the ideal electric plant or station of the future, light will be furnished at night, and the engines will be worked to their full capacity during the day in order to supply power to all the mills in the vicinity with which to run their shafting. As said before, this can be done to-day to a certain extent by placing the second machine in the mill desiring the power. This is now being accomplished at Lawrence, Mass., where from the same station furnishing light at night is distributed during the day time from one to five horse-power whenever it is required.

The large saving of expense to mill-owners by such an arrangement is clearly apparent. They require no boilers nor engines, no engineers, no stokers and no coal. An eminent and careful electrician once told us that in a good-sized electric-light plant, situated in a large manufacturing district, the amount that could readily be received for the power furnished by wire during the day would be sufficient to pay all the expenses of operating the station, besides paying interest on the money invested in the same, and that hence the money received for the light furnished at night would be clear profit.

The President and Executive Committee are certainly entitled to the thanks of all persons in the electric-lighting field, for the energetic and practical manner in which they have carried this convention to a successful issue; and through their efforts we now have what promises to be the most important Association in this country or Europe. This great work has been a labor of love on the part of the energetic officers, and that it is being appreciated is shown by the promptness with which all the leading electric light companies of the United States are uniting with the association.

From the beginning to the end of the sitting the convention was a pronounced success. Admirable order was preserved throughout, and the air of goodfellowship and fraternal sympathy was conspicuous during and after the proceedings.

We sincerely hope this good feeling will always be maintained, and that the National Electric Light Association will prove itself worthy of its mission.

ELECTRIC LIGHT ASSOCIATION.

(*Continued from page* 1.)

Please extend to convention my best wishes for its success, and the sincere hope that the deliberations will be wise and business-like and calculated to render substantial aid in the efforts of manufacturers generally to place the electric-light business on a profitable, enduring basis. "EDWARD H. GOFF."

Mr. Duncan—"I move to amend article 4 of the constitution by inserting the following clause:

"The officers of this association shall be a president, three vice-presidents, a secretary and a treasurer and six members of the Executive Committee, all of whom shall be members of the association." The amendment was adopted.

Mr. Duncan—"I move further, that the Executive Committee be instructed to prepare by-laws for the government of the association." The amendment was adopted.

The President—"I would like to state here that Mr. Porter's company is running a Brush plant composed of one lighting machine and operating one lamp. I would ask if this convention consider Mr. Porter, under these circumstances eligible to vote? Does Mr. Porter desire to press his right to active membership?"

Mr Porter—"Yes, certainly."

Mr. Leggett—"I make a motion in advance that Article 2 of the constitution be construed—that the words "firms or individuals operating electric light plants"—that that be construed to include only individuals or companies or firms which are doing a lighting business with their plant, not for their own private purposes. I only thought that while it brings into the association members that might be desirable in other respects, yet it is not forwarding the interests of the association. I understand that to be more particularly companies manufacturing electric lighting apparatus, or firms, individuals or companies who are operating a central station from which they are supplying electric light as a business, not for their own private purposes—public lighting—I understand that those are the parties who are intended by the constitution to be active members."

Mr. Wadsworth—"I hope this motion will not prevail, because, if it does, it will shut out from this convention the representatives of every mill in New England, and there are mills there operating plants of from 100 to 600 lights; and men operating a plant of that size certainly have a right to active membership here. It is desirable for the convention to get them here. It is desirable for this convention to hear from them the experience they have met with in operating those plants in cotton and woolen mills; and I know personally a good many of the representatives of those mills who are not only thoroughly posted in electrical matters, but who can give this convention, or any members of it, valuable information in regard to operating electric light plants. They operate all the various systems of the United States, both arc and incandescent, and at our meeting in Chicago we held out inducements to them to come here. We formulated this constitution with the understanding that they were to be represented, and I think at this late day it would be entirely wrong to say they cannot come into it."

Mr. Leggett—"I agree with Mr. Wadsworth's views with respect to the desirability of having such individuals or firms represented in this association, but it does not appear to me that they need to come here as regular members; but that the constitution, if it is not already by amendment made broad enough to permit these parties to come in as associate members, might be so changed as to permit them to come in as associate members without a vote. We can then have the advantage of their presence, and they can have the advantage of the association."

Mr. Duncan—"I think the amendment should prevail for the very reason stated by Mr. Wadsworth in opposition to it. These mill men, when they see this association is run from a business standpoint, will then have some confidence in the association, and will be glad to become associate members

and give us the experience of their training and their personal observation of their plant; but when they see that all outside interests, manufacturers of wire and everything else, may become full voting members in the association, they will lose confidence in it."

The chairman called Mr. Weeks to preside, and said: "When the question of forming this association was first mooted at Chicago, this was one of the stumbling-blocks in the way. It was discussed fully in all its bearings. The objection made there to the admission of such gentlemen as Mr. Wadsworth, such gentlemen as Mr. Porter, and other men who are virtually dealers in supplies, and not electric-light men, was just such as Mr. Duncan has gone over now. On the other hand, the business in which they are engaged is closely allied to that of electric lighting, being a part of the electric-lighting business itself, you may say, it was very difficult to draw the line. The line was drawn, however, at this point - that a man was a user of an electric-light plant was entitled thereby to active membership in the association; but it was understood that that use of the electric light plant was to be of sufficient size to entitle him to some consideration among electric-lighting men. In other words, that the questions that would arise in this convention—that the result of questions, and the discussion upon them, would be for the benefit of the men who operate electric-light plants Now, I want to ask you, if a gentleman running a one-light Brush machine with one lamp, in a carbon factory, representing the carbon interests absolutely and entirely, if he has sufficient interest in that one lamp burning out at Pittsburgh to entitle him to be benefited in any way, so far as his electric light is concerned, by the discussions which take place in this convention? It was not the intention of the framers of this constitution; it was not the intention of the convention which adopted it; it was not the intention of the gentlemen who voted upon that constitution to make this convention a convention to advance the interests of men who dealt in electric light supplies. It was the intention of the framers of this constitution; it was the intention of the gentlemen who voted for the adoption of this constitution, that its beneficial results should accrue to those who were engaged in the business of electric lighting. But you will ask, 'Why do you take the money belonging to these gentlemen—Mr. Porter's company and others?' With a full knowledge on the part of Mr. Porter when he came into this room that he was only to be an associate member, he paid his ten dollars and received his ticket. In the hurry and bustle and crude form in which this association finds itself, starting on its first step before the public, Mr. Porter sits in the convention, and when his vote is required by some one else it is only then that he finds he is qualified to vote by reason of using a one-lamp Brush light. Now I assume that it is not the intention of this convention to depart from the principle it has adopted to make it an electric lighting association. The information which the members of the Electric Light Association receive from the dealers in electric supplies makes it very desirable that these gentlemen should be associate members of this association. The benefits which the dealers in supplies receive by being brought face to face and directly in contact with the men who consume their articles, make it desirable for them to be associate members and thereby recoup themselves for whatever expense they may have incurred to attend this convention. I therefore assume that it is desirable on both sides to have the gentlemen in this business in this association. I feel it desirable, but it was believed proper and right to draw the line somewhere, and the line was drawn as I have endeavored to explain to you. I have no objection to Mr. Porter. I have no objection to the representative of Benedict & Burnham, who operates a plant of 36 lights, and who asks me: 'Am I not eligible to active membership?' I said that question would be decided when the case of Mr. Porter was decided. Now if this amendment to the constitution prevails you will not only cut off Mr. Porter and those applying for the benefits of active membership, but you will deprive gentlemen already holding active membership in the association of that membership. Now, I ask you, is it wise to press the amendment? Was it wise to press an application for active membership under this constitution? I claim that Mr. Porter's business is purely that of electrical supplies; that he has no interest in electric lighting other than his parallel interest in articles consumed in electric lighting. If Mr. Porter had a plant where he was employing an engineer to take care of his plant, it would be necessary to send that man here to give such information as might arise in the discussion. He runs one light. There is no information which Mr. Porter would carry home that he would apply to the light, but he would apply it to the carbon business. All these things make it unwise to force on this convention a questionable right to active membership."

Mr. Fishback—"I would like to know why Mr. Wadsworth is left on the other side of that line. Why is Mr. Wadsworth interested any differently from those other carbon factories that have as many lights?"

The President, Mr. Morrison—"Mr. Wadsworth was operating a plant sufficiently large—this was the representation at the Chicago meeting—to make it desirable for him to seek information and to carry it home as regards the economical method of running electric lights; not to apply it in his business of carbon dealer, but to apply it in the electric-light part of his business. Mr. Wadsworth was an active member of the association, elected as such at Chicago, and he carries his active membership here. If the amendment Mr. Leggett proposed prevails Mr. Wadsworth ceases at once to be an active member."

Mr. Fishback—"At the convention at Chicago our claims were made and recognized. Yet to-day, in calling off the names, our company was omitted from the list. I intended to press the matter in a quiet way, but as long as it has been brought up I would just like to know the reason, that is all. We are running a plant which is, I think, equally as large as the Boulton Company's, and use it to light our factory at night."

Mr. Cooper—"In order to get around this difficult question, I will move an amendment to the second article of the constitution to read: 'The members of this association shall be companies, firms of individuals operating electric-light plants for rental, or firms or individuals using at least 50 arc lights or 350 incandescent lights.'"

Mr. Wadsworth—"In reply to my friend Mr. Fishback's question, I would simply say that when I became an active member of this association I said I represented a plant I do. I represent 35 lights composed of about four different systems Now, so far as myself being an active member of this convention is concerned, it is immaterial to me. It would make no difference to my business whether I was an active or associate member, but in the interest of other men, mill men and others, whom I know to be largely interested in this electric lighting business, men who have got two dollars for every one invested in this business by a great many members on this floor; I say that it is wrong that we make false promises in order to get what men in here we have got here representing certain private plants; and if we pass this resolution depriving them of active membership they will not come here."

The President—"If I give the association the result of Mr. Wadsworth's special pleading it will perhaps throw some little light on the subject. After he and the other gentlemen have been engaged in advancing the interests of the association throughout the United States, we have *one* mill represented in this national association—one mill, that is the Riverside Mill. I do not think, therefore, that that will affect the result."

Mr. Leggett—"I hope the amendment of Mr. Cooper will not prevail. I think the line should be drawn just where it was originally intended that it should be drawn, and to rule out companies, who are simply operating private plants, from active membership, and to include in the association just what was doubtless originally intended to be included—companies, firms or individuals who are operating plants for the purpose of furnishing light, renting lights, for private or public purposes. Now, there is a reason in this. Take the action of our Executive Committee as reported to-day upon the subjects for discussion before this convention—the feasibility and costs of underground wires, for instance. What has a private individual, operating an electric light for his own purposes or a mill having a private plant—what interest have they in a subject of that character? Now take another subject—the advisability of tower lighting in preference to pole lighting. You might take each subject right straight through that was named by our President to-day. Every one relates to that kind of matter which pertains to the public lighting plants. Now it is a matter of very great concern to the lighting companies in this country to know about these things and to organize themselves together into an association; and it seems to me that on matters which require a vote, on measures to be adopted, that those companies should not be trammelled in any way by the votes of parties, or individuals, or firms, or corporations which are not interested in this matter of public lighting or renting electric lights. All these gentlemen are welcome here. They can get their ten dollars' worth of information. This association invites them to speak on a certain subject. They are present to be heard, and they are present to hear. They can get all the information they seek, and we can get the advantage of their experience. But when it comes right down to a vote upon matters which affect our interests as parties who are renting electric lights; as parties who are governed by municipal legislation, required to go under ground, and required to go over ground; as parties interested in tower or pole lighting; when we are to have ourselves subjected to a vote by a party who has no interest in those things, no interest in common—that is in those respects—it seems to me it is out of place. Now, I do not know that this is exactly limited to the United States. I do not know why under our constitution a Canadian or English company might not be represented here. We are very apt to have a very large membership, and if we open this to every individual who is operating more than 50 lights, why we will be so flooded with individuals who have no interests in the matters at stake that we will become unwieldly, and we will be unable to transact our business. No disrespect is intended towards these parties. We can get information from them without their being active members, if they are here as associate members. I think, therefore, that in this first move of the association, when it comes to a matter of putting ourselves on a proper foundation for business, that we ought to be guided by no sentiment. We ought to draw the line clean and sharp. I hope, therefore, the amendment of Mr. Cooper to my amendment to the constitution, which provides for letting in the companies operating more than a certain number of arc or incandescent lights, will not prevail, and that the amendments will be adopted to the effect that it shall be limited to persons, firms or corporations who are operating lights, renting them to private or public consumers, and engaged in the business of manufacturing electric light apparatus."

Mr. Cooper—"I withdraw my amendment."

Mr. Wadsworth—"I would like to ask why the manufacturers of electric lighting apparatus are not excluded. If you are going to exclude manufacturers of other supplies, why not exclude them? I would like to ask that as a matter of information."

The President—"Perhaps Mr. Leggett can answer that question. I know no reason why they should not be excluded."

Mr. Leggett—"I should say simply this, that we are dependent on that kind of thing. That comes right home to us. It is not so necessary with carbons. Carbon is in the nature of supplies, but when we come to purchase our supplies—when we want the thing made in this way or that way—those people are people who ought to be among us."

Mr. Poor—"I move an amendment to the effect that the constitution be amended so as to limit the active membership to those who make electric light for public sale only."

Mr. Bowen—"I agree most cordially with Mr. Wadsworth in the idea of putting a liberal construction on the membership of this association. We need the moral and pecuniary support of every man who operates an electric light, in my judgment. There are very few men operating electric light plants but can give us some information that would be valuable to us. With that thing in mind, I move that the whole subject be laid on the table, and that the constitution remain as it now is." The motion to lay on the table was lost.

Mr. King, of Baltimore—"I would propose that this matter be referred to a committee (of which I shall not be one) of three, to be presented to this association at some future time. It does appear to me, sir, that this is a very important matter. I look upon this as an association calculated to advance the interests of the electric lighting of the world. I believe, sir, that it can be such an association. If you admit all without any regard to their knowledge or attainments on the subject of electric lighting, you will have an unwieldy, large association. If you limit the active membership to those who are actively engaged in important matters of manufacturing plants, you will then be able to keep it in strict bounds; and, sir, is there any one here that would pretend to say that any gentleman who is interested in the electric lighting would not receive the value of ten dollars a year? I think not, sir. I think that the man who is engaged in running a very few lights will get a great deal more than his ten dollars. For my part, sir, I do feel an interest in lights, as you well know, and it was with a great deal of pleasure and anticipated information that I came here, and I yet expect to hear a great deal and to be amply repaid; and, therefore, I make the motion to refer this matter to a committee of three, in order that it may be presented at some future time." This motion prevailed, and the chair appointed as the committee Cooper, of Brooklyn; Leggett, of Detroit, and Weeks, or Kansas City.

Mr. Bowen—"There is at present in this City and Brooklyn, an electrical commission. It seems to me it would be very proper to invite them to be present at the deliberations of this convention, and I therefore offer the following resolution:"

Resolved, "That the Electrical Sub-ways Commission of the Cities of New York and Brooklyn, be invited to attend this convention, and be accorded all the privileges of the floor."

Mr. Leggett—"I move also, that we extend an invitation to at least one of them to address us on this matter. Several of the Companies have already gone under ground, and they have already obtained information that would be exceedingly valuable to us. I saw the report in a New York paper that two of the telegraph companies had reported to the commission the completion of their work, and the commission requested them to file plans and specifications showing how the work was done. My own company are very desirous of getting information on these matters, for we are liable to be thrown under ground at any time."

Mr. Ridlon—"I move that the Mayors of New York and Brooklyn be included."

The President—"Invitations have already been extended to these gentlemen whom you intended to invite, and the Mayor of New York has declined. The question before you is to extend an invitation to the New York and Brooklyn Commissioners on Sub-ways to attend the meeting of this association, and accord them the privileges of the floor." The motion was carried, and the convention adjourned to 10.00 A. M., Wednesday.

WEDNESDAY'S SESSION.

The committee appointed to report on the amendment of Article 2 of the Constitution, submitted the following, which was adopted: 'Members of this Association shall be persons, firms or corporations engaged in the lighting

(*Continued on page* 8.)

Telephonic News

*** Lightning wrenched a cornet from a man's hands during a recent storm in Lancaster, Pa. A good joke, by thunder.—*Adj. O. G.*

*** The attorneys for the Indianapolis telephone patrons have made up a test case, and Baker, Hord & Hendricks are now preparing an answer to it. It will be filed about September 1, at which time the affidavits will be filed against the company for violation of the law. The test case will be in the form of a writ of mandate asking that the company's agents be made to appear and show cause why they do not conform to the law, and the contest will probably be made on the demurrer. The case will be stubbornly contested.

*** Mr. Frederick A. Gower of telephone fame, and the husband of Lillian Norton Gower, the *prima donna*, is reported in England as missing since his ascension in a balloon from Cherburg, France, on July 18. Mr. Gower has been conducting a series of experiments looking to the employment of balloons for war purposes, and had made several ascensions for that purpose. The time which has elapsed since his last ascent presents good reason for concern at his absence and silence. Mr. Gower is a native of Sedgwick, Me., and is about 33 years old. Left fatherless at the age of two years, he was educated by a gentleman in Farmington. He was for several years on the staff of the Providence *Press*. Associated with Alexander Graham Bell in the development of the telephone he made a large fortune by the formation of telephone companies in Europe. He and Miss Norton were married about three years ago.

*** Mr. C. B. Lister, Secretary and Treasurer of the Matengo and Perry Telephone and Telegraph Company, was in town this week. He came over the *route* for the purpose of inspecting the posts that have been put along the line. He stated that the line had been completed to Dayton, and that by the 20th of August this place would be reached. We are glad to note this step of progression on the part of some of our country people, and wonder why it is so few of them do not take hold of this enterprise. This *route* should by all means be extended on to Demopolis, and we urge upon the stockholders to push it right along by Spring Hill to Demopolis. We hear that one gentleman proposes to give $200. It will only take about $500 more. Why can't it be made up at once? We see no earthly excuse for letting this work go undone. Go to work, somebody, and get up the required sum.—*Lindon, Ala., Reporter.*

*** Fire Commissioner Poillon, of Brooklyn, has sent a letter to the Electrical Subway Commission of that city, on the subject of placing the wires underground. He states that his Department has no special plan to recommend, but is willing to do all in his power to assist the Commission in getting the wires underground. Still he does not think that the law compels the city departments to comply with the provisions requiring telegraph and telephone wires to be placed underground, unless the necessary funds for the purpose have been first provided, and none were provided by the last Board of Estimates. He states further that the present system of wires is not as complete as it should be. There are 1,749 poles, on which about 225 miles of wires are strung, running through 189 different streets, and he desires permission to erect 265 more poles to carry from thirty to thirty-five more miles of wire. He wants also to put up twenty more fire-alarm boxes, most of them in the outer wards; and he intends to connect his Department with all the public institutions, but must wait for that until his system of wires is completed, as stated.

*** We hear that the telephone industry in Russia is soon to receive considerable impetus.

*** If the word "reconstruction" had never been invented how happy telephone managers and stockholders might be.

*** It is said that barbed wire fences conduct lightning. A man who has ever sat down unexpectedly upon one of those nuisances will be convinced that they keep lightning on draught all the time.

*** Warren F. Weston, Rufus G. Fuller and George B. Catlin have filed articles of association of the Adirondack Telegraph and Telephone Company. The principal office is at Keene, Essex County. The capital is $100,000, divided into 10,000 shares.

*** The "immediate-delivery" stamp to be issued will contain a representation of "a messenger boy on the dead run." If it contained the representation of a dead messenger boy on a shutter, it would be more in harmony with the general belief as to the habits of those youths.

*** Theodore N. Vail, Boston, has received patents on a "telephone circuit and apparatus," and on a "central and subsidiary telephone exchange system, circuit and apparatus." In the first patent there are twenty-one claims, thirty two in the other, the whole comprising a method of connecting various exchanges and sub-stations.

*** Messrs. Holmes, Booth & Haydens, of this city, have just issued a neat and valuable table of dimensions and resistances of pure copper wire, the calculations being made by Geo. B. Prescott, Jr., on the basis of Dr. Matthiessen's standard. This little work, which is copyrighted by Messrs. Holmes, Booth and Haydens, will be of particular interest and value to all telephone, telegraph and electric light men.

*** In those cities where the cost of telephone service is regulated by the number of times the instrument is used, business men find they can do very nicely on one half the number of calls they thought necessary under the system of paying a stipulated rental and using the telephone as often as desired. A Buffalo firm that sent 2,000 messages annually heretofore finds that 800 the last year answered every purpose.

*** The telephone company doing business in Brooklyn showed a willingness to put its wires under ground as far as practicable before the law authorizing the appointment of the Commission was passed, and did actually establish one circuit of underground wires as an experiment, intending, if it were found successful, to extend the same; and since then has expressed its readiness to do so, waiting now, apparently, only for an embodiment of the wisdom of the Commission in some plan which will do even justice to all the companies interested. It even wanted to put the wires underground in Washington street before the repaving was done, which was a wise and economical proposition in the public interests as well as in its own; but official red tape intervened, and now, when the proposition shall be acceded to, if at all, the street will have to be torn up again for the purpose and repaved.

*** The Brooklyn press are confident that their Underground Wire Commission is superior to the one appointed in New York. One paper says: "In Brooklyn two of the gentlemen who will be called upon to solve the electric sub-way problem are well-known scientists, while the third, who is a lawyer, will be able to guide his associates in any legal complication that may arise. When it is remembered that under the provisions of the act poles and overhead wires must be removed by November 1 next, it must become evident that it is very necessary that no time should be lost in considering the many plans that will be submitted, in order that the best may be determined and the unsatisfactory be rejected. It is the intention of the Brooklyn Commissioners, if conflicting plans are submitted, to labor to bring about a compromise, and, with that end in view, they will, after careful investigation, invite persons interested in electric wires to meet them and to discuss the entire subject with them."

*** The Standard Underground Cable Company, of Pittsburgh, is at work upon an order for nearly 200 miles of wire for the Chicago Telephone Company. Each cable carries 50 wires, and the total weight of the order will be about 150,000 pounds. The wires, after being covered separately by a special compound, are enclosed in lead.

*** To deter boys from climbing the telephone poles at Fon du Lac the plan of attaching wire to the spikes and connecting them with a battery was conceived and it worked to perfection. The first day no less than 200 boys attempted to climb the pole but immediately received such a shock that they retreated in dismay. Later, however, a farmer drove up to the pole and hitched his horses. One of the animals unsuspectingly caught hold of the spike and immediately there was a start and a jump, and the hitching-strap snapped and away went the team. The farmer suffered the fracture of three ribs in attempting to stop the runaways, one or more women were run over and the wagon smashed to atoms.

*** In front of the Great Southern Telephone and Telegraph Company this morning *The Item* observed a large reel of cable, and going up-stairs to Mr. J. J. Fowler, the assistant general manager, that gentleman explained that the cable was to be shipped to Paincourtville, on Bayou Lafourche, to replace the defective cable now being operated at that point. Mr. Fowler stated that the company was determined to give the full benefit of the telephonic communication to the city, and does not propose to stop on a question of expense as substantial auxiliaries must be obtained. A commendable feature of the application of this cable is its being of American manufacture. Up to some three or four years ago, that character of material was purchased in Europe. The company has therefore shown a proper disposition, and acted wisely in purchasing the cable from the American manufacturers, Messrs. A. G. Day & Co., of New York. The same character of cable, bought in Europe, with freight charges, etc., would cost, delivered in New Orleans, fully ten per cent. more without giving any better results. Mr. Fowler further stated that the line extended from Baton Rouge to Bayou Sara; does service from Port Hudson, Jackson, Laurelville, La., Turnbull, Ashwood and Woodville, Miss. The people at these points have not been slow to avail themselves of this line to correspond with New Orleans, and the business done so far, indicates a very favorable prospect.—*New Orleans Item.*

Maiden's Moustaches Taken Out By the Use of Electricity.

It was the face of a handsome brunette just verging into womanhood. On her upper lip, and slightly shading its scarlet hue, grew a dark, silken moustache that on a dude would have been cherished and cultivated as the choicest treasure on earth. Her head rested on a metal plate connected by a wire with a galvanic battery on the table. The doctor took from the table at his elbow something that looked like an ebony pen staff. This also was connected with the battery. In the end was a very fine gold-plated needle. The doctor looked cautiously over the young lady's dainty little moustache, and, at length singling out a hair, inserted the point of the needle down by the hair bulb, and, pressing a little spring in the handle, turned on the current from the battery.

When the electric current ran down the point of the little needle the young lady winced and clenched her hands, while the tears came into her eyes. This lasted only for a moment, for as soon as a little froth appeared around the needle it was removed and the hair dropped out. After forcing out about a dozen of hairs on each side of the lip the doctor stopped. The young lady removed her head from the metal plate, wiped her face with a scented pocket-handkerchief, and tripped gaily to the mirror. She took a long glance of intense satisfaction, and gleefully remarked that they would soon all be gone. Then she put on her hat and left, after having made an appointment for another sitting.

"So you remove moustaches from the young ladies who are unfortunate enough to have such hirsute adornments," remarked the reporter, "Will you tell me how it is done?"

"The operation is not very new," was the reply. "It has been known and practiced for several years, especially in the East. The The electric current decomposes the salt in the skin into acid, which goes to the metal plate, and alkali, which accumulates around the needle and destroys the hair bulb, so that the hair can never reappear. This method is also very useful in removing the ugly bristles that grow in moles, for the hairs are then large in size and few in number. It is only necessary to spend a few seconds on each hair, and but a few seconds on a dozen, after which a rest of several days is taken to allow the inflammation to disappear, before undertaking any more.

A Milwaukee Telephonic Poet Seeking a New Theory.

Editors Electrical Review:

Your correspondent who advises the interpreter of telephonic disturbances to "look wise and call it induction," reminds me of a bit of doggerel I wrote when building telephone exchanges in 1881, which, I think, ran as follows:

If you are anxious for to shine in the telephonic line as a man of culture rare,
You must gather up some germs of scientific terms and plant them everywhere.
You must talk about induction, and be wise on each production of the electrician's hand;
The meaning doesn't matter if it's only idle chatter which your friends can't understand.
And every one will say, as you walk your mystic way,
"If this young man expresses himself in terms too deep for me,
Why, what a very singularly deep young man this telephone man must be."

In our territory, during the past month, we have exhausted our vocabulary in trying to find a term which will express the thorough "cussedness" of noisy wires. The much-abused but elastic "sheol" (so recently coined) might be used, but we who are working the wires have been getting so much "sheol" on account of them that it would scarcely offer a variety.

Now, if we attempt to give the noisy wires "sheol," it will be like the much abused but enduring clerk, who, with great patience, exclaimed, "Never mind; I'll take it out of the office boy."

Can you not find some one who will offer us a new and elastic theory to "chew on" until the troubles subside? A. S. H.

Milwaukee, Wis., Aug. 15.

* * From a report of Mr. H. Walker, Commissioner of Lands of British North Borneo, it appears that gold exists in considerable quantities in that territory. Some natives had brought a little to Sandakan, and Mr. Walker set out to verify its existence in the Sagama District. He searched thirty or forty different places, and found gold at almost every place, generally in small distinct specks, large enough to be gathered with the fingers, sometimes larger, and always in conjunction with a black metallic dust and iron or copper pyrites The rocks met with were granite, gneiss, quartz, limestone, jasper, porphyries, red sandstone. Steps will probably be taken to have the whole region thoroughly examined by a competent geologist. The minerals already ascertained to exist in North Borneo are gold, silver, copper, chromium, tin, plumbago, lead, and coal. Antimony and cinnabar are reported. On the west coast, chromium, copper, and arsenic have been found; in the neighborhood of Kinabalu, silver ore and pyrites; a sample of native copper has been sent to London; a rich sample of galena and silver, yielding on assay 115 ounces of silver to the ton, has been found. Hitherto, the officials of the company and the other Europeans on the coast have been dependent for local information respecting these and other minerals on the rough statements of natives. It appears certain, however, that, besides its great forest and agricultural wealth, British North Borneo is also rich in minerals—how rich cannot be said until a thorough examination has been made.

Competition in Telegraphing.

The property of the Bankers and Merchants' Telegraph Company, with all the law suits involved, was sold yesterday to the highest bidder under the foreclosure of the mortgage held by the Farmers' Loan and Trust Company. The highest bidder is supposed to represent the reorganization committee of the bondholders, and there is a further supposition that the plan is to consolidate this property with that of the Southern and Postal Telegraph Companies, and to include that of the American Rapid if it can be extricated from the tangle with the Western Union into which it has been put by the action of Receiver Harland. Among the property sold, besides the poles, wires, cables and instruments of the Bankers and Merchants' Company, was a large amount of securities, including many shares of the stock of the Southern and American Rapid Companies and of other corporations A claim was put in by Receiver Harland that the American Rapid had a lien upon the stock of the Bankers and Merchants' and owned a large amount of the property sold. There were other claims of minor importance, which can probably be disposed of without difficulty.

The plan for a new company which shall be an effective competitor with the Western Union is one in which the public has a decided interest. It would have been carried out without serious embarrassment but for the fact that Receiver Harland, of the American Rapid Company, was induced by the ruling spirit of the Western Union to make a contract with that company for the operation of the lines in his charge. There is no interpretation to be put upon his action except that he was induced to aid in the monopolizing scheme of the Western Union by taking a step designed to defeat the plan of reorganization. This is more apparent when we consider that there was a suit pending to separate the lines of the American Rapid and the Bankers and Merchants' and determine the property of each, and that he did not wait for it to come to trial. He made a contract and undertook to carry it out with the help of the courts before he knew what lines were subject to his control. It is to be hoped that this mischievous action can be undone, and that all litigation will speedily be got rid of.

There is further encouragement in a specific denial from Mr. Robert Garrett of the report that a movement was on foot for giving the Western Union control of the lines of the Baltimore and Ohio Company. It is needless to say how desirable for the public it is to have a genuine competition maintained in the telegraph business It is at present the only defence against excessive rates. If the Baltimore and Ohio system kept independent and is extended, and if the new consolidation plan is carried out, there will be a competition between all important points and in the ocean telegraph business, which will be a fair guarantee of reasonable rates to the public. The opposition to the Western Union ought to be strong enough to induce it to give up the effort at monopoly which could only result finally in an irresistible demand for Government control.

Already the stock of the Western Union has been enormously inflated and heavily burdened by its successive absorptions of rivals. If it had spent half the money and energy in building up its lines and its business in a legitimate way that it has devoted to killing opposition, it would have been in a better condition to-day. As it is, with its immense plant and its control of patents, it ought to have no difficulty is maintaining itself in any contest with rivals and making a reasonable profit for its stockholders. There is one thing certain, if there is to be a monopoly in the telegraph business it ought not to be permitted to remain in the unchecked control of any corporation. But monopoly is not a necessity, and unless the Government is prepared to take the business into its own hands, it should adopt measures calculated to maintain real competition. The telegraph is an important instrument in inter-State commerce, and as such is subject to Government regulation. It can prohibit any consolidation or absorption hereafter of competing inter-State lines and can enforce such a prohibition. Considering the constant tendency to combination, it ought to take some such action, at the same time providing against the cut-throat competition which is a familiar method of destroying rivals.—*New York Times.*

Telegraph Lines in Mexico.

The proposition to sell or rent the Government's telegraph lines, as a measure of relief to the Federal Treasury, does not seem a practical one. Any company buying a telegraph system wishes, first of all, to be assured of an annual net earning, and the exhibit made in the Government reports on the telegraph lines is not a very encouraging one. This year's budget makes the following appropriations:

Salaries	$ 613,341 90
For the preservation of lines	420,000 00
For new lines	150,000 00
Total	$1,183,341 90

The latest annual report of the income of the telegraphs gives the following figures:

For private messages	$ 223,172 93
For official messages	616,965 84
Total income	$ 840,138 77

Putting aside the construction of new lines, it will be seen that the cost of the telegraph lines per year is $1,033,341.90, while the last report of income shows only $840,000, indicating an annual deficit of nearly $200,000. This exhibit is not an encouraging one for any company thinking of taking the lines. It is not probable that private business over the lines will greatly increase until the country is more settled. And it is on the increase of private business that a company would have to depend to make a profit. The extent of the Government telegraph system of the country last year was 21,000 kilometers.—*Mexican Financier.*

.... Operations in connection with the new telegraphic cable from Aberdeen to Shetland have been successfully completed, and communication between these places may now be said to be satisfactorily established. The work is being conducted by the single process, but it is expected that the duplex principle will be shortly introduced. The line was decided upon by the English Department after careful investigation during the the winter, and its object is to facilitate the business of the herring trade, which is now commencing for the season all along the north-east coast. The cable ship "Monarch" has been employed in the work for the past three weeks. The total length of the line is about 300 miles. The advantage of the new arrangement is that direct communication can now be had between Shetland and London with only one retransmission, namely, at Aberdeen. There were formerly three transmissions—Edinburgh, Inverness, and Wick—and the great benefit of the telegraphic facilities now afforded is obvious.

.... Major J. G. Pangborn, of the Baltimore & Ohio Railroad Co. has produced a book, which, though by no means as massive as "Picturesque B. & O.," is none the less striking. It is entitled "Electric B. & O.," and is elevated to describing the history of the Baltimore & Ohio Telegraph Company. In the course of the narrative many interesting facts connected with the Morse system of telegraphy are for the first time placed before the public, and although the book is an advertisement, the reading matter is not overburdened with "puffs" in the interest of the company, thus making its perusal very agreeable. The lithographic work in the illustration of the book is in decidedly unique style. Most striking is the cover, which has a ground of solid black upon which is traced in lines like forked lightning the word "Electric," while Puck, in robes of brilliant red, weaves a coil of wires into the letters "B. & O." On the back of the cover is a portrait of Thales, one of the seven wise men of Greece. Every page of the book is illustrated with lithographs, and the typography and press work are of marked superiority. Anyone who desires to obtain a copy of "Electric B. & O." can do so upon writing to D. H. Bates, president, New York, and enclosing stamp for return postage.

.... The new system of sixpenny telegrams will be inaugurated in England October 1st. Extensive arrangements have been made by the Post Office Telegraphic Department to handle the increased business.

.... The Postal Telegraph Company, which began business between Boston and New York a month ago, with an office at No. 4 Arch street, is still operating in an experimental way, transmitting its customers' despatches over the Commercial Cable Company's wires. It depends upon how the Bankers & Merchants' Company's proceedings terminate to determine the future and permanent course the Postal Company will take. At present its Boston office, quietly established, is but temporary, though the business is fair for the facilities in use.

.... The Inter-State Telegraph Construction Company has filed articles of incorporation with the County Clerk at Detroit. The incorporators are Richard A. Shipman, Wm. G. Latimer, Levi T. Griffin, J. C. Verhoff and John B. Whelan, all of Detroit. The purpose of the company is to construct a line of telegraph from Kalamazoo eastward through Marshall, Albion, Jackson, Ann Arbor and Ypsilanti to Detroit, thence to Toledo and Fostoria. The capital is $50,000, and Shipman and Latimer hold 1,940 of the 2,000 shares. The construction of the line is to be commenced in a few days, and when completed it will be used for the special benefit of inland daily newspapers. It will be connected with the Bankers and Merchants' lines.

.... When the construction of the great trunk subterranean telegraph lines in France and Germany was entered upon, it was thought that owing to their depth underground, and their sheathing of metal in contact with the earth, they would be exempt from the influences of atmospheric disturbances. M. Blavier, the well-known electrician, has nevertheless pointed out recently to the French Academy of Sciences, that in times of storm currents are produced in these lines, which discharge themselves through the lightning protectors, melting their fine wires. They are, however, less violent than the currents in aerial wires, and do not appear to interfere with the traffic. They are evidently due to storms in the country, at a distance more or less great from cities, where the lines are protected by systems of gas and water pipes. During a storm on March 9, at the middle of the line between Belfort and Besancon, sparks were seen at the terminal stations, whilst in the two cities hardly any atmospheric perturbation was noticeable. M. Blavier explains the phenomenon, which is familiar to those who have tested submarine cables in tropical seas, as due to electro-dynamic or electrostatic induction caused by the electricity of the storm.

.... The chief train dispatcher of one of the Indianapolis systems of roads, writing with reference to the benefits to be derived by the American Train Dispatchers' Association from having State auxiliaries, says: "The suggestion is a good one, and should receive a better recognition than was accorded it at the late Convention held in Denver, Colorado. There were about 220 delegates at Denver and the proxies of 200 more were voted by the members who were present. While a majority are in favor of taking active measures for continuing the national organization and the present enthusiasm they do not seem to realize what an important factor State organization would play in their deliberations. I am well satisfied that unless the above point is made a leading question at their annual Convention in Chicago next June, the more experienced will lose interest in the welfare of the Association. I would suggest that members in their respective States call meetings and resolve to put the subject of State organization before the next annual Convention in such a clear and forcible manner as will insure its adoption. Then let each State send delegates, regularly elected, to the National Convention, fully instructed, and I promise there will be results highly satisfactory, not only to the members of the Association, but to their General Managers and Superintendents."

TELEGRAPHIC

.... The Chamber of Deputies, Paris, have passed the bill for laying a telegraph cable between Senegal and Gaboon.

.... The Persian Government intends constructing a telegraph line between Meshed and Sarakhs. The greater part of the necessary material is ready.

.... The Electrical Subway Commissioners in New York report that they find the telegraph companies generally willing to place their wires under ground.

.... The longest span of wire in the world is used for a telegraph in India, over the river Kistnah, between Bezorah and Sectynagrum. It is more than 6,000 feet in length, and is 1,200 feet high.

.... The telegraph kings have taken to signing their cable despatches (free) with their single names — "Pender," "Field," "Gould," "Green," and so on—like the great lords and diplomatists, say "Salisbury," "Dufferin," or "Fish."

.... The daily press for the last week has been devoting several columns to the publication of cable despatches that passed between eminent telegraph men on either side of the Atlantic. The question is whether there have been any negotiations looking to a sale of the Baltimore & Ohio Telegraph Company to the Western Union. The time when this will come about is very far in the future we venture to predict.

.... Who is responsible for this? A telegram was handed in on Tuesday last at one of the metropolitan stations of the Post Office Telegraphs for despatch to a suburban locality some five miles distant. This was at 1:40 P. M., and the message did not reach its destination until seven minutes past eight on the following morning. If that is the way the Post Office transacts its business under the conditions of the present tariff, it had better leave sixpenny telegrams alone.—*London Electrician.*

.... Mr. Edward S. Stokes, the new president of the Bankers and Merchants' Telegraph Company, is quoted as saying that he is prepared to satisfy all prior liens upon the property until the new company is fully organized and prepared to issue its bonds. These will consist of $1,200,000 of first mortgages, and $3,600,000 of second mortgages, which will represent a total issue of $3,000,000 of stock and $8,800,000 of bonds, against $3,000,000 stock and $10,000,000 bonds of the old company.

.... In certain districts of India the wires are being continually broken by monkeys, which have a habit of climbing the poles and disporting themselves on the wires, frequently breaking them, thereby entailing considerable labor and expense, especially so as this usually occurs in sparsely populated districts, where the stations are several hundred miles apart. Bears in Northern Europe have been known to tear down telegraph posts, being attracted by the noise of the wind passing through the wires, it is supposed, mistaking the humming sound for that made by a swarm of bees, bears being ravenously fond of honey.

.... The case of Brown *vs.* Western Union Tel. Co. was one brought for neglect of the company to deliver a message sent appellant by his broker informing him of the purchase of stock on his account. The market declined heavily, and the broker, hearing nothing from appellant, sold out the stock at a heavy loss. The appellant asserted that if the message had been delivered he would have remitted a margin sufficient to prevent the stock being sacrificed, or have directed a sale at the first point of decline, and sought to recover from the company his loss on the sale. The Kentucky Court of Appeals, however, held that as to appellant's loss the negligence of the company was a remote source of damage for which he could not recover.

ELECTRIC LIGHT ASSOCIATION.

(*Continued from page 5.*)

business, to wit: that of supplying electric lights from a station to public or *private consumers*, as distinguished from such as are operating private plants, or engaged in the manufacture or sale of electric machinery, apparatus or supplies."

The last sentence in Article III of the Constitution, was on motion of Mr. Leggett, amended by substituting the word "consent" for "request" so as to read as follows: "Such associate members shall pay the same dues as members; shall be entitled to seats at all meetings, but have no vote; shall be ineligible to office, and shall be entitled to the floor only with the consent of the Executive Committee or presiding officer."

On motion of Mr. Weeks the following Article was added to the Constitution,

"Applications for membership shall be made to the President, and by him shall be referred to the Executive Committee and they shall have power to act thereon."

On motion of Mr. Ridlon, it was agreed that the chair should appoint a committee, to consist of one representative from each system represented in the Association, to consider the question of maintaining, by the several manufacturing and lighting Companies, a uniformity of prices, for electric lighting apparatus and supplies.

Mr. Geo. S. Bowen, of Elgin, Ill., spoke in an entertaining strain on the history and applications of electricity; in speaking of the advance made in the electrical field he said:—"When Franklin succeeded in his efforts to control the lightning with his kite, the goodly people of Philadelphia thought him possessed of evil; now we cook our tea, run sewing machines, operate railway trains, light our Hell gates and our great lighthouses, send messages around the world, heal the sick, print our newspapers, make our homes and business places cheerful, and by its beautiful and brilliant effulgence illuminate our cities and villages, and yet we have only commenced the utilization of this subtle and wonderful force, that cannot be analyzed by the chemist, dissected by the surgeon, weighed by the grocer . . . Again, give us the highest civilization we can enjoy; give us sound and healthy bodies; give us no more darkness, but give us light! More light! Give us the electric light. It is the poor, as well as the rich man's light. It will light the suburbs as well as the central portions of your cities. It is in fact, the light for all."

Mr. Bowen was followed by Mr. A. F. Upton, of the Jarvis Furnace Company, in a particularly excellent paper, on the subject of power used in electric lighting. The work of the Jarvis Furnace Co., in connection with electric lighting plants was reviewed in general, and the proper adaptation of means to ends in the use of steam power in electric-light plants was entered into quite fully—"The principal thing, to my mind," said Mr. Upton, "in regard to electric lighting is the power, and then comes the cost of power." This is the key-note of the entire paper which contains much valuable information, but which is too extended to be given in full. We propose in our next issue, to give a verbatim report of this paper, together with the discussion which followed—participated in by Messrs. Upton, Duncan, Sperry, Cleveland, Winchester, Pope, Ridlon, Jepson, De Camp, Weeks, Ide, and Officer.

A very interesting paper was read by Mr. W. W. Leggett, of Detroit, on the subject of tower lighting of towns and cities. He entered into detailed objections to arc lighting of streets by poles at low altitudes, among which may be mentioned the obscuring of the light by foliage, the dazzling, unpleasant effect on the eyes, the expense, etc., etc. He then advanced points in favor of tower lighting, as, for instance, the soft, pleasing effect, the smaller number of lights to illuminate a given area, the fact that back yards and alleys are lighted equally almost with the streets themselves, etc.

Many interesting figures were given in reference to the superiority of the tower system of illumination over that of gas, but lack of space forbids their publication in the present issue. In conclusion Mr. Leggett summarized with the following recommendations:

1. Towers not less than 150 nor more than 175 feet in height.
2. Lamps of 2,000 candle-power.
3. Five or six lamps for a central tower, but not more than four for each of the others.
4. That in dense business sections towers should stand 1,000 feet apart; for the best residence sections 2,000 feet apart, and for the remaining sections and suburbs about 2,500 feet to 3,000 feet apart.
5. That they should be arranged as nearly as possible in triangular order so as to blend the light from at least three towers over the most distant sections.
6. In towns of 12,000 inhabitants, or less, one central tower and others arranged 2,500 feet therefrom. In villages, one tower with six to eight lights will answer every purpose, and should be 175 feet in height.

Dr. Otto A. Moses, of New York, then addressed the convention on the subject of "Incandescence." He said: "You have reached a point in arc lighting from which for some time to come we are not to expect very much improvement. You have been able to struggle against your common enemy, gas, and when you have eliminated it from the streets of the cities of the United States, you think the time has come for you to eliminate each other. Now, incandescent lighting has reached that point of development where in many places it has been able to compete with gas, and with arc lighting. If you examine the most remarkable installation of incandescent light in the world, the one bounded by Broadway, Wall street, etc., in the city of New York, you will not find one arc light running from the central station which supplies that incandescent light. And why? For the reason that it is a bagatelle. The amount of light that would be consumed in the streets in that incandescent district is so small as to be unnoticeable. You may say that it is a very large amount of money to expend in a small area, and for that reason they have taken a territory which in no way competes with the arc lighting company, and therefore their fields are distinct. The statement which I make is based on statistical observation. The street lighting of the city of New York is about 5 per cent. of the total lighting of the city, but in smaller towns the percentage is not more than three. So you see that when you have conquered the whole field you cannot encroach on the field of the incandescent lamp. You will find that when you have the whole thing, it amounts to about 5 per cent. Who have the rest? Our common enemy, the gas companies.

"If electricity is to prevail as an illuminant, it can only be by means of the incandescent light. Now, then, since the arc lights have reached a point of perfection, we will consider why they cannot extend their domain. In the first place, arc lights have reached a certain point of the development where the elements of light given are fixed; a certain amount of electro-motive force, almost a standard, some portions varying from an eighth of an inch to half an inch; a standard of carbon—perhaps of seven-sixteenths of an inch average—all these things are fixed. The length of line, attendance, cost of carbon, breakage of lamps, all those things are fixed. You cannot get any more light out of an arc lamp than you are getting to-day. You will get, as Mr. Bowen remarks, 50,000 candles; you may get a quasi 2,000. Now, in comparing an arc light and an incandescent light, you will find that an [arc will give a great deal more light for the fuel consumed, I think you may say five times as much light as an incandescent light, for the fuel. But everyone will admit that through the consequent sub-division of light in the incandescent light you get what is more than commensurate. As to the cost of supplying carbons, that is more than the cost of supplying the filament for the incandescent light, so that we can eliminate that. We come, laying aside the first investment, to this fact, that you can get five times as much light, per pound of coal consumed, in the arc light than you can in the incandescent light. But I think you will all admit that you are not going to get any more out of your arc lights. That has reached its limit. The problem is simple and has been solved. Now, where is the limit of this fledgeling incandescent lamp? The incandescent lamp that was used in the beginning of 1879, the experimental lamps of Sayre and others, were not economical at all; they used large conductors in vacuo, but the vacuo was imperfect. Finally, in one great step, the world saw in 1879 and 1880 a sudden departure in the mechanism of incandescent lamps. The principles all existed. They were known since 1846, from the time of Starr who took out a patent on the incandescence of carbon in vacuo. His vacuum was very poor, and his carbon was a thick rod. In 1879 incandescent lighting, after a very long gestation, was born. We have to-day an infant seven years old that I think is going to strangle gas with one hand and petroleum with the other. That infant is a very robust one. He is to-day competing with a very well-developed man. He is competing with arc lighting. He is also competing with gas lighting. And is he to stop his growth in his seventh year? I think that is asking too much of him, particularly when he has in New York and elsewhere, some very good foster-mothers, who are supplying him with all the experimental food that he may need, and he is gradually developing and will continue to develop. But as he is, he can hold his own in competition with gas and arc lighting to a certain extent, an extent that implies his great development. Now, what is he going to be in the next seven years? Let us see where his elements of progress lie. Let us consider the limit to begin with. We find that the incandescent lamp, as it exists, is a very small filament of some hydro-carbon substances. You find Cruto, in Italy, making a carbon much smaller than is now used, piled up by deposition from gases. He takes a material that is already an excellent conductor of electricity, and deposits his carbon on it, and then he builds up a perfectly solid and homogeneous material that produces a wonderful economy. It costs a good deal, but that is nothing. The first lamps costs $150 each. The day will come, gentlemen, when you will see carbons made just as easily as thread is made by the Willimantic Company. It is simply necessary to time your deposits. Now, when that can be done, and that is simply a matter of mechanical ingenuity, you will get, instead of the present economy of nine 16-candle lamps or ten 16-candle lamps, 30, 40 or 50. I will take a carbon to-day, and bring it to a point of incandescence where it will represent one hundred. That is a question of finance of carbon. The life of the lamp has to come from other matter. That is the result of experience and the integral character of the material employed. When that day comes, the death-sentence of gas has been passed. It is simply a question of burning coal under boilers. To-day the cost of the incandescent lamp is less than one mill per hour. You, gentlemen, spoke of exceptional cases of arc lights being run at a cost of two mills. Give me the coal to burn under the boiler and one mill will be the only cost of the incandescent lamp. Give me plant and coal and fixed capital, and the other is simply a matter of the cost of the lamp, which is at the present prices simply one mill per hour. That is based on the life of one lamp at one dollar for one thousand hours. The subject is an endless one, and you will excuse me if I retire and allow others to speak." [Applause]

The president made a few remarks in which he paid a pleasant compliment to Dr. Moses. He admitted that the arc light must stop at the door of the dwelling, or of the hotel, excepting the lobby, but thought that it was entitled to a little more than 5 per cent. of the lighting business. He thought that the arc light had reached a point at which it became a business success. "I take it," said he, "that every man in this room, because you are all thinking and intelligent men, will have carried away a bee in his bonnet that will keep him thinking for some time to come. When I say 'we' I mean the men who have their brains and their money both in electric lighting, and are eternally searching for something that will be of a greater commercial value than what we now possess. We are looking forward to the time when we will have these promises redeemed in the incandescent field. I believe the near future is pregnant with great results in the field of electric lighting. We will wait for that. We will let the gentlemen who have started experiments keep them up until we get along to a point where we can make money."

Mr. Holt, of the Brush Company, Cleveland, addressed the convention on the subject of arc and incandescent lamps, on the same circuit. He said: "In Grand Rapids, Michigan, the Thomas cut-out is used, and reported highly successful. The system is one to which any kind of incandescent lamp may be adapted. The lamps are run in groups. The system run by the Brush company embraces seven groups, connected to their 2,000 candle-power circuit. In connection with each group, is put in what is called a multiple series cut-out, and so arranged, that if one or more of the lights should go out, this cut-out operates either to short-circuit the group and extinguish the rest of the lamps, or in some cases to throw in a resistance equal to the number of lamps cut out. Or in other cases to throw in a resistance which is somewhat less than the working resistance of any of the lamps, consequently the remaining lamps are dimmed only. Of course the cut-out is better for the general circuit, but with the other, the lights being simply dimmed, the consumer is not deprived of all light. He can immediately tell which lamp has failed. You can readily see that this system can be adapted to almost any circumstances, except those of house lighting. We do not recommend it for house lighting, because there is well-founded prejudice against introducing high-tension currents into houses. But for stores, offices, hotels, and all places where people prefer the incandescent light to the arc light, it is a system that is beautifully adapted."

A short general discussion followed which was participated in by Messrs. Ridlon, Morrison, Leggett, Weeks, De Camp, Moses, Upton, and others, and the convention adjourned, to meet at 10 o'clock, on Thursday.

THURSDAY'S SESSION.

The first business was the selection of Baltimore, Md., as the place of the next meeting of the association, February, 1886, and the appointment of a committee of five on transportation, consisting of Geo. Wadsworth, Cleveland; E. R. Weeks, Kansas City; Geo. S. Bowen, Elgin, Ill.; Frank Ridlon, Boston; H. M. Cleveland, Hartford.

The following resolution, by Mr. Ridlon, was adopted:

Resolved:—"That the office of this association shall be located in Baltimore, and be the repository of all matters pertaining to the subject of electric lighting, motive power and kindred subjects, and that correspondence be solicited with all foreign and home associations, all of which shall be placed on file, subject to the use of the members of the association."

A resolution to Messrs. Dam & De Revere, proprietors of the Union Square Hotel, warmly thanking them for their generous hospitalities and many courtesies, was unanimously adopted.

Mr. Bowen urged on the members the desirability of promptly answering all communications addressed to them by the president.

A committee consisting of R. W. Pope, W. J. Johnston and Geo. Worthington of New York, was appointed to invite prominent electricians of foreign countries to become associate members.

Mr. E. A. Sperry, of Chicago, presented a Paper on "The Best Form of Dynamo," illustrating by means of a blackboard. The paper was most attentively listened to, and is a valuable contribution that will appear in the REVIEW in a later edition. In the discussion that followed, Mr. Spang spoke in favor of the Ball Unipolar Dynamo, and introduced the following resolution which was adopted:

Resolved:—"That a committee of three be appointed, who shall send a communication to each company manufacturing dynamos requesting them to submit a 5—10—15 ampere machine, capable of producing not less than 30 arc lights, and an incandescent machine capable of producing not less than 200 incandescent lights, within one year's time, to the association, to be tested by them."

Mr. F. J. Sprague, of New York, also

spoke on the matter, using the blackboard to illustrate his remarks: "In order to obtain the field, without resorting to mathematical calculations, it is well," he said "to run an armature in its field without any load. Take the intensity by an electrometer, and then calculate the number of feet per second that wire has to move to develop at its terminals an electrical force on one volt. Taking such a field as the Edison field, let *that* part of the field (referring to sketch) be the active field leading out to this part where the lines cross. Now, I want to get that crossing; that is the number of feet per second which a wire has to move in order to develop one volt at its terminals. We take blocks in the commutator, we take the length of the field in inches, that is all the active part of the field. Take that (indicating) as the length of the field. Multiply that by the diameter in inches of the armature; that by the revolutions, and that by the number of laps the wire has there. Divide that by 2,750 multiplied by the volts, and it gives you the number of feet per second that the wire has to move to develop an electric force of one volt."

The discussion was continued by Messrs. Spang, Sperry, and others.

Mr. Ralph W. Pope, of the *Electrician and Electrical Engineer*, read a paper on "Placing Wires Underground." An interesting discussion followed and was continued until final adjournment at two o'clock. The discussion was opened by Mr. Geo. H. Benjamin, who said that having studied the subject exhaustively and having made many experiments in connection with Dr. Siemens, he was fully convinced that an indispensable requisite to a satisfactory system was an underground conduit in which the wires are bare, and in which every wire can be individually removed. The wires must be isolated from each other, and there must be no possibility of moisture. The speaker referred to the Berthoud-Borel cable which is made by imbedding wires in cotton and saturating the cotton with linseed oil, which had been subjected to a very high temperature, and incorporated with a certain amount of resin. This cable is considered the best. It is used in France on about 300 miles of telephone wire and 170 miles of electric light wire. In Paris it is carried through the sewers principally. He also described the gutta-percha system, which does not stand the temperature as well, although its specific conducting capacity is somewhat higher. He referred to a third system which is in use in London. With the underground system there is no more interference than with the overhead system. The transmission of speech by underground wires was fully as good if not better than by the overhead system, and the actual cost of keeping them in order was fully 150 per cent. less. It costs about 30 per cent. more to lay an underground than an overhead system, but when once the wires are laid underground they are there for good.

Mr. Sperry, of Chicago:—"We are operating about two miles of underground conduit from our central station in Chicago, and my experience is that the underground system is a very expensive system for maintaining. We had to abandon lead-covered cable. In the conduit system the wires are laid in contiguous holes. The insulation and maintenance of underground lines, especially where they go under area ways, is very unsatisfactory, as people who occupy the areas are constantly putting articles against them. On the whole, I do not think it a satisfactory system although it is in its infancy and things may improve."

Mr. De Camp, of Philadelphia—"I happen to have in my pocket a memorandum of the cost of maintenance for seven months of our overhead wires outside of buildings, there are about 67 miles. The cost, as I have it, is figured on the basis of the cost of our fuels and carbons, all other expenses under subdivided heads. The average cost for last seven months has been $\frac{17}{100}$ of a cent per lamp per hour."

The Chairman (after some figuring)—"It appears that Mr. De Camp can run his system at $1.36 per day, while it costs me $10 per day. I want this explained. Does not the city furnish the poles?"

Mr. De Camp—"Yes; they keep up the poles, and their renewal is not included in these expenses. Still, we would be glad to have our own poles. In the five years we have been in operation we have not had the expense of renewing the poles, and all that sort of work."

Mr. Curtis, of Cleveland—"I would ask Mr. Benjamin if in his investigations he has ever found any underground system that he would be willing to adopt and put his money into it?"

Mr. Benjamin—"I would answer that by saying that I do not think I would put any money in the electric light business. However, if I was in position where I could supply 600 subscribers, I shouldn't undoubtedly put down a lead-covered cable."

Mr. Holt, of Cleveland—"It seems to me if the electric light companies were compelled to put up a straight line of poles, having say, the electric light wires at the bottom, telephone wires higher up, and the telegraph wires still higher up, using both sides of the street, that that would overcome the difficulty of too many overhead wires. The way to carry a weightless force like electricity is up in the air, is much safer, much better, and the expense is much less."

Mr. W. O. Callender, of London, England—"I profoundly feel that any one coming before a society of electric-light engineers to advocate the underground system must appear at great disadvantage. During last year the spread of the incandescent light through England has been very extensive; the arc light is disappearing from England. I do not think there are 500 arc lights in existence there, with the exception of those in the railway stations. An underground system must have a material as an insulator which will not be affected by drouth, dampness, the earth, sewer gases, or escaping gas. After a great many years in the use of bitumen in the making of asphalt, I found that it was practically indestructible. In 1869, I laid a very large work in London, and very recently I took up some samples and found it to be 100 per cent. exactly as it was the day it was laid down. By experiment, made with a view of rendering it plastic, I succeeded in producing a substance which I call bitite (Mr. Callender here exhibited a series of plans for underground systems). This plan was prepared because we were applied to by the Brush and United States companies to prepare a sketch for them, showing how we bring up mains from one point to another, that were not to be tapped at all. The singular thing, I may say, is, that in England all the electric lighting companies are disappearing. The only two left are Anglo-American-Brush, and the Edison. One large company has gone into bankruptcy, the matters were so financed that the price paid to some one for the license to form these companies was so high that they could not live. For instance, the London and Metropolitan paid £500,000 for the right to use the Brush machines. If any company can exist after paying such a sum as that, it is a mystery not yet solved."

The hour for adjournment—2 o'clock—having arrived, the President thanked the convention for the courteous treatment he had received, and, after announcing the committees published below, declared the convention adjourned.

The following Conference Committee on the matter of uniformity of prices of apparatus and service was appointed: Frank Ridlon, Brush-Swan, Boston; Charles Cooper, Thomson-Houston, Brooklyn; George S. Bowen, Van Depoele, Elgin; W. A. Chase, Schuyler, Holyoke; C. B. Ver Nooy, Sperry, Chicago; Mr. Lyne, Ball, Jersey City; A. L. Ide, Fuller, Springfield, Ill.; A. J. DeCamp, Brush Electric Co., Philadelphia; Thomas Smith, Ft. Wayne, Jenney, Peoria; George D. Guernsey, Excelsior, St. Louis.

The following committees were announced to report on the subjects named at the next convention. These committees will receive additional names, which will be announced from the President's office at Baltimore:

Electricity as an Illuminant—Messrs. Bowen, Chicago; Moses, New York; Sperry, Chicago; Cleveland, Hartford; and Holt, Cleveland.

Proper Construction and Maintenance of Wires—Messrs. A. J. Holt, Cleveland; A. J. Dalzell, Hartford; P. Fahay, Boston; S. A. Duncan, Pittsburgh; E. R. Weeks, Kansas City.

Steam Power—Messrs. Ide, of Springfield; D. E Evans, Baltimore; De Camp, Philadelphia.

Underground Lines—Messrs. Ralph W. Pope, New York; E. A. Sperry, Chicago; W. R. Patterson, Chicago.

Incandescent Lighting—Dr. Otto A. Moses, and others.

History and Progress of Electric Lighting—George Worthington, ELECTRICAL REVIEW.

History and Progress of Electricity as Applied to Motors—W. J. Johnston.

Electric Lighting in Canada—C. A. Ross, Montreal, Canada.

Measurement of High-Tension Currents, Best Instruments for—C. J. Van Depoele, Chicago; Prof. Thomson and E. J. Houston, of Philadelphia.

Best Equipment for Arc Lighting Stations—D. E. Evans, of Baltimore, and N. S Possens, Cleveland.

Operating Expenses—E. R. Weeks, Kansas City; A. J. De Camp, Philadelphia; D. W. Guernsey, St. Louis; George O'Connor, New Orleans; E. H. Goff, New York; H. C. Tudor, Baltimore, Md.

Line Wire, Best for Overhead Lines, Size, Insulation, etc.—H. M. Cleveland, Hartford.

Carbons and Globes—Frank Ridlon, Boston, and others.

Storage Batteries—A. J. Holt and George H. Benjamin.

Motors—Charles J. Van Depoele and Wm. Hochhausen.

Arc Lighting—Wm. Hochhausen.

MEMBERS OF THE ASSOCIATION.

The following list of names represents those companies and individuals who had united with the organization up to date of adjournment, and had paid admission fee. The names are published in the order they were received by the president:

New Haven Electric Co., New Haven, Conn.
Mitchell, Vance & Co., Electroliers, New York.
ELECTRICAL REVIEW, New York.
Electrical Supply Co., New York.
Brush-Swan Electric Co. of New England, New York.
H. C. Adams, of Holmes, Booth & Haydens, New York.
Wm. Hockhausen, Excelsior Electric Co., Brooklyn.
Geo. D. Allen, Excelsior Electric Co., B'klyn.
Brush Electric Light Co, Philadelphia.
Swift Electric Light Co., East Saginaw, Mich.
American Electric & Manufacturing Co., New York.
Guernsey-Scudder Electric Light Co., St. Louis.
Consolidated Electric Light Co., of Portland, Me.
Brush Electric Illuminating Co., New York.
Clark B. Hotchkiss, Day's Kerite Co., New York.
J. A. Roebling's Sons & Co. (Cables and Wires), New York.
Royal Electric Co., Montreal.
Thomson-Houston Electric Light Co., Philadelphia.
Worcester Electric Light Co., Worcester, Mass.
Fort Wayne Jenney Electric Light Co., Fort Wayne, Ind.
Minnesota Brush Electric Light Co., Minneapolis, Minn.
Jarvis Engineering Co., Boston, Mass.
Van Depoele Electric Mfg. Co., Chicago.
Allegheny County Light Co., Pittsburgh.
Wm. L. Libby & Sons, Boston.
Riverside & Oswego Mills, Providence.
Callender Insulating Co.
Poughkeepsie Electric Light & Power Co., Poughkeepsie, N. Y.
Schuyler Electric Light Co., Hartford, Conn.
H. M Linnell, Electric Light Co., Hartford, Conn.
Springfield Electric Light Co., Springfield, Mass
Pittsburgh Carbon Co., Pittsburgh.
Joseph Jepson Electric Light Co., Norwich, Conn.
Ball Electric Light Co, Reading, Pa.
Steam Supply & Electric Light Co., Springfield, Ill.
Morse & White, Wire, Boston, Mass.
Daft Electric Light Co., Greenville, N. J.
North Adams Electric Light Co., North Adams, Mass.
Bridgeport Electric Light Co., Bridgeport, Conn.
Brookline Electric Light Co., Brookline, Mass.
Holyoke Electric Light & Power Co., Holyoke, Mass.
Gilbert Donaldson, Electric Light Co., St. Paul.
La Crosse Electric Light & Power Co. La Crosse, Wis.
Star Iron Tower Co., Fort Wayne, Ind.
Electrical Supply Co., Chicago.
Parker-Russell Mining & Mfg. Co., St. Louis.
Kansas City Electric Light Co., Kansas City Mo.
W. B. Cleveland, Forest City Electric Light Co., Cleveland, O.
Municipal Electric Light Co., Brooklyn.
Albany Electric Illuminating Co., Albany N. Y
A. J Dam, Isolated Plant, New York.
Cassidy & Co., Electroliers, N. Y.
Patterson Company Limited, Globes and Brackets, New York.
Wm. Baxter, Jun., Baxter Electric Light Co., New York.
Elgin Electric Light Co., Elgin, Ill.
Benedict & Burnham, Waterbury, Conn.
Brush Electric Light Co., Boston.
Boulton Carbon Co, Cleveland, Ohio.
Armington & Sims Engine Co., Providence, R. I.
Standard Underground Cable Co., Pittsburgh, Pa.
— Pilcher, Council Bluffs Electric Light Co., Council Bluffs, Iowa.
Geo. A. Mayo, Boston.
Brush Electric Light Co., Detroit, Mich.
Sperry Electric Light Co., Chicago.
Brush Electric Co., Cleveland, O.
Brush Electric Lighting Co., Indianapolis.
Westinghouse, Church, Kerr & Co., New York.
Bridgeport Brass Co., Bridgeport, Conn.
Ansonia Brass & Copper Co., New York.
W. B. Cleveland, Forest City Carbon Co., Cleveland.
Everett Morse, Boston.
Otto A. Moses, New York.
J. N. Candee, Poughkeepsie.
C. M. Thompson, Callender Co., N. Y.

THE ATTENDANCE.

We publish below a complete list of names of the gentlemen attending the meetings of the convention:

J. F. Morrison, Brush Company, Baltimore; H. M. Cleveland, Schuyler Company, Hartford; Geo. S. Bowen, Elgin Electric Light Company, Elgin, Ill; E. A. Sperry, Sperry Company, Chicago; H. W. Spang Ball Company, Reading; E. A. Goff, American Electric and Manufacturing Company, New York; E. R. Weeks, Thomson-Houston, Kansas City, Mo.; Wm. Hochhausen, Excelsior Company, Brooklyn; Geo. D. Allen, Excelsior Company, Brooklyn; Chas Dustin, Schuyler Company, Hartford; Chas. Cooper, Municipal Company, Brooklyn; Frank Ridlon, Brush-Swan Co., Boston; P. Fayhay, Brush-Swan Company, Boston; S. A. Duncan, Brush Company, Pittsburgh; F. W. King, Brush Company, Baltimore; Joseph Jepson, Thomson-Houston Co., Norwich, Ct.; A. J. Holt and C. C. Curtis, Brush (parent) Company, Cleveland; W. W. Leggett, Detroit Electric (tower) Company; E. J. O'Beirne, Star Iron Tower Company, Fort Wayne, Ind.; J. F. Upton, President Jarvis Furnace Company, Boston; J. F. Noonan, Paterson Electric Light Company, Paterson, N. J.; Thos. Officer, Council Bluffs Electric Light Company; John J. Moore, Springfield, (Mass.) Electric Light Company; W. H. Baker, W. J. Jenks and A. J. Elder, American Manufacturing Company, New York; Henry C. Carmen, Tesla Electric Light Company, Rahway, N. J.; R. J. Winchester, Holyoke (Mass.) Electric Light and Power Company; A. De Camp, Brush Company, Philadelphia; F. H. Gilbert and James English, New Haven (Conn.) Electric Light Company; H. C. Adams and M. E. Baird, Holmes, Booth & Haydens; Clark B. Hotchkiss, Day's Kerite Cable Company; W. O. Callender, Callender Insulating Company, Newark; H. Thayer, F. Harrington, Chas. Rolfe, Western Electric Company, New York; H. B. Lytle and Geo. L. Beetle, Lytle & Co., New York; Geo. W. Parker and L. M. Fishback, Parker-Russell Carbon Company, St. Louis; D. H. Tuxworth and R. S. Garrett, Southern Electric Company, Baltimore, Md.; A. L. Ide, Ide Engine Company, Springfield, Ill.; Geo. F. Porter, Pittsburgh Carbon Company; Geo Wadsworth, Boulton Carbon Company Cleveland; A. L. Libbey, Globes, Boston; H. D. Stanley, Bridgeport Brass Works, Bridgeport, Conn.; President Nicholson, Ball Engine Company, Reading; Mr. Coggeshall, Mitchell, Vance & Co., New York; Geo. L. Wiley, Waring Cable, New York; Major D. P. Heap, Secretary U. S. Lighthouse Board, Washington; Lieut. J. Millis, in charge of lighthouse experiments at Hell Gate and Staten Island; Alfred Moore, Wire, Philadelphia; Geo. A. Mayo, Mayo Electric Company, Boston; Walter C. Kerr, Westinghouse, Church, Kerr & Co.; Gilbert M. Smith, Ansonia Brass and Copper Company, New York; J. B. Sheriff, Sheriff, Son & Company, Pittsburgh, builders of high-speed engines; H. L. Brintnall, East Saginaw, Mich.